University of Alberta

Measuring Forest Dependence: Implications for Aboriginal Communities

by

Dianne Korber

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Science

in

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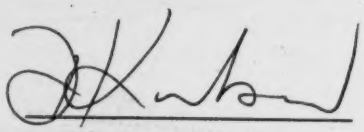

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *Measuring Forest Dependence: Implications for Aboriginal Communities* submitted by Dianne Korber in partial fulfillment of the requirements for the degree of Master of Science in Forest Economics.

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Abstract

Past studies of economic base measures of forest dependence have inadequately addressed the full nature of economic forest dependence in Aboriginal communities, by either ignoring the contribution of the subsistence economy or excluding Indian reserves. This thesis presents findings based on the recalculation of an economic base measure of forest industry dependence (using 1991 census data, and including a transfer payment sector) which show that omitting Aboriginal communities from forest industry dependence measures represents an omission in the number of forest industry dependent communities and population in the prairie provinces.

The economic base measure of forest industry dependence is also evaluated for potential to include a subsistence economy-related sector. Analysis reveals that the economic base measure does not adequately capture the contribution of in-kind income from subsistence activities. If the subsistence sector is included in the forest industry dependence measure the relationships predicted by economic base theory do not hold, and the forestry industry dependence measure no longer provides a useful means to rank and compare forest industry dependent communities.

In areas where there is reliance on income from forest industry related jobs, as and/or the subsistence economy, a more comprehensive account of forest dependence must be developed to fully understand the effects of changes in forest industry markets and forest policy on communities' economies where the subsistence economy is practiced.

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Chapter 1.0. Introduction

1.1. Study Problem

The Canadian government has been criticized for its failure to promote policies which address the needs of remote and rural resource dependent communities (Fuller *et. al.* 1989, Young 1989). The lack of regional development policy has engendered a corresponding concern over the relative absence of baseline data on the location and number of, and conditions in, remote communities whose economies are heavily influenced by national and international policies and economic conditions (Fuller *et. al.* 1989, Young 1989). Of particular concern are communities dependent on narrow natural resource bases. Such a characteristic increases a community's vulnerability to exogenous economic impacts, and makes the community susceptible to fluctuations in resource supply (Fletcher 1991). If policy is to address community needs, the location and the degree of resource dependence of such communities must be known (Fuller *et. al.* 1989).

Since the late 1970s only a small number of studies on resource dependent communities in Canada have been produced. These studies have progressively contributed to developing an approach to measure and identify economic dependence upon a natural resource base (Department of Regional Economic Expansion (DREE) 1977 and revised 1979, White *et. al.* 1986, Pharand 1988, Steele *et. al.* 1988, Fletcher

1991). However, Canadian studies of forest dependence have failed to explicitly address the full nature of forest dependence in Aboriginal communities.

Some researchers (Pharand 1988, Steele *et. al.* 1988) include Indian reserves and Aboriginal communities without acknowledging existing differences in forest activities and uses. Other studies (DREE 1979, White *et. al.* 1986) exclude Indian reserves from forest dependence analysis, but do not explicitly state what factors warrant this exclusion. Fletcher (1991) excludes Indian reserves from his calculations on the basis of cultural differences, and governmental differences such as treaty rights to transfer payments.

An important limitation of past measures of forest dependence with respect to Aboriginal communities are their narrow definition of "forest dependence". Previously used measures are based solely on commercial activity such as timber extraction and production, and related forest industry activities.[1] Many Aboriginal people in forested regions participate in hunting, trapping, and gathering activities.[2] These forest-based activities contribute, substantially in some communities, to the total economy of Aboriginal communities.

A further limitation of past forest industry dependence measures is the focus on wage income or employment. The contribution from transfer payments to the total economy is overlooked (Horne and Penner 1992). Dependence on transfer payment

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[1] Henceforth, forest industry dependence will be used to define dependence on the timber industry and related activities. 'Forest' dependence will denote dependence on a wider range of forest-related activities including industrial forestry activities.

[2] Hunting, trapping and gathering activities which provide solely for domestic consumption are referred to here as subsistence activities, or the subsistence economy.'

income is common in many remote communities where employment is often periodic or temporary. The economy of many Aboriginal communities are based on a balance of wages, transfer payments and in-kind income sources from subsistence activities.

1.2. Research Objectives and Purpose

The objective of this study is to investigate the utility of incorporating contributions to the economy from transfer payment income and the subsistence sector into a measure of forest industry dependence. Forest industry dependence measures typically focus on the *inflow* of income or employment to a community. Transfer payments function as an inflow of income and, in this study, are included in calculations of dependence. Identifying the transfer payment sector as part of the economic base provides added information about the level of economic diversity within a forest industry dependent community.

Theoretical difficulties associated with including the subsistence economy in measures of dependence are also identified and discussed. The subsistence economy affects the flow of cash income. Also, forest industry sector activities and employment may affect the level of subsistence activity. In light of these difficulties, the effect of including the subsistence sector on the forest industry dependence measure is illustrated in a case study using recently collected data on subsistence activity from the community of Waterhen, Saskatchewan. This analysis reveals some of the problems

associated with using forestry dependence measures to direct policy programs and projects in locations where the effects of such changes are unclear.

This study shows that measures of economic base dependence can provide a general indication of community forest industry dependence associated with inflows of external cash income (including transfer payments). However, it is also important to recognize the role of, and interactions of the modern economy with, subsistence activities in forest, and forest industry, dependent Aboriginal communities. Acknowledging these limitations, dependence measures can help to identify remote communities with specialized economies where in-depth social science impact research and analysis are needed if the effects of planning, policy and market impacts are to be clearly identified. This research also highlights the need to continue to search for more comprehensive indicators of forest dependence.

Chapter 2.0. Literature Review and Theoretical Background of Economic Base Theory

This chapter reviews past studies that pursue the identification of natural resource dependent communities in Canada. In particular, a study by Fletcher (1991) is examined that measures dependence as a function of the economic base, and provides a theoretical basis by which to compare forest industry dependent communities. Economic base theory is then reviewed.

2.1. Past Studies of Community Resource Dependence

The Canadian government has produced several studies that identify and measure the degree of resource dependence in rural communities.[3] In a study by the Department of Regional Economic Expansion (DREE 1977, and revised 1979) the ratio of employment in a given industrial sector to total employment is used as a measure of dependence. A community is considered dependent if the ratio exceeds an arbitrarily chosen minimum. The minimum levels of dependence also vary depending on the population of communities. This practice reflects the fact that larger communities have larger service sectors than smaller communities. The author recognizes that in remote communities the service sector is supported mainly by

[3] Fletcher *et al.* (1991) provide a thorough review of Canadian-based studies of resource dependence.

resource sector exports. Thus, the larger the population, the lower the ratio (percentage of forest industry employment out of total employment) required for a community to be considered dependent.

Using methods similar to DREE's, White *et. al.* (1986) research forest industry dependent communities in British Columbia. The authors also measure forest industry dependence as the proportion of labour force in the forest industry sector to the total labour force, and adjust dependence levels according to population size. The authors adjust for varying degrees of dependence by categorizing communities with a forest industry as: specialized (forestry sector dominates); dual (two prominent sectors, including forestry); diversified (three dominant sectors including forestry); and non-forest specialized (other dominant sectors, but forestry within the top five sectors). If the forestry sector is not in the top five sectors, the community is categorized as minor or no forest sector.

In 1988 two studies (Pharand, and Steele *et. al.*) from the Canadian Forest Service followed DREE's approach. However, Steele *et. al.* do not adjust dependence levels for varying population sizes. Further, both studies focus only on forest industry activity, and no additional information is provided pertaining to levels of sectoral diversification.

Although employment ratios convey some information about individual communities, there are problems in using this measure for comparisons of dependence levels between communities of different population sizes (Fletcher 1991). Economic

base theory provides a theoretical explanation of this issue and a framework to address this problem.[4]

2.2. Measuring Dependence as a Function of the Economic Base

According to economic base theory a community is dependent upon basic activity, defined as exogenously determined local economic activity.[5] All other local activity is considered non-basic. Non-basic activity is internally (locally) determined, and is assumed to be dependent upon the basic sector. Local economic growth results from any event that increases the inflow of cash into a region and generates a multiplier effect of spending and re-spending in the non-basic sector.

Regional economists recognize there are other factors that can influence local economic growth besides exogenous demand (Richardson 1985). As the economy and population of a community increase, internal factors such as labour productivity, availability of intermediate inputs, capital and entrepreneurship become more influential as determinants of growth (Blair 1991). Therefore, economic-base analysis

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[4] Two bibliographic sources for historical development of economic base models are: 1.) Isard, W. (1960) Methods of Regional Analysis: An Introduction to Regional Science. Englewood Cliffs, N.J.: Prentice-Hall Inc., and 2.) Richardson, H. W. (1985) "Input-Output and Economic Base Multipliers: Looking Backward and Forward" in Journal of Regional Science. 25 (4):607-661.

[5] Early formulations of the economic base model assume income from export activity to be the sole determinant of local activity (North 1955). However, it is recognized that there are other exogenous activities that bring money into a local economy, such as investment income (Tiebout 1962), federally and provincially funded employment (Isserman 1977), and retirement and transfer payment income (Schwartz 1982, Horne and Penner 1992).

is considered to be more appropriate for studies of relatively small, rural communities (Tiebout 1956, Pleeter 1980, Richardson 1985, Blair 1991).

Economic base analysis provides a practical basis for estimating dependence on external income sources in remote communities. Given the common characteristic of a relatively high basic to total employment ratio, remote communities are particularly dependent upon basic activity that provides income to purchase imports (Fletcher 1991). Generally, multiplier effects in rural communities tend to be small, and local economies are characteristically undiversified. Remote communities typically fail to benefit from the multiplier effects of basic activity because of income leakage (non-local spending of income) from the local economy. If, however, the increase in basic activity is significant and prolonged, multiplier-induced growth of the non-basic sector will likely occur.

Using the economic base measure of dependence to compare communities of different populations avoids the problems associated with the more straightforward approach of comparing the ratio of industry to total employment. Fletcher (1991) points out that the ratio of industry to total employment with adjustments for population size does not reflect the fact that as a community's population increases, the base to total employment ratio decreases. This occurs because larger communities are able to provide more services because of the advantages created from economies of scale, and larger market demand. As a result, the ratio of non-basic to basic activity tends to be larger in large communities than in small communities. If the ratio of

industry to total employment is used, larger communities are less likely than small communities to be considered dependent. However, given that the non-basic sector is considered to depend upon basic activity, it may be erroneous to conclude that the larger community is not dependent.

Another factor that affects the ratio of non-basic to basic activity is that some communities are more advantageously located, and thus serve a wider market area with a greater variety of goods and services, than other communities of similar population.[6] Such communities' non-basic sectors are larger due to increased basic sector activity (i.e., the external market is larger for these communities than in relatively more remote communities of similar size). Again, as a result of the larger non-basic sector, such communities may not be described as dependent according to industry to total employment ratios (Fletcher 1991).

Past researchers have recognized the problem of comparing different sized communities on the basis of the industry to total employment ratio. However, their arbitrary adjustments lack technical consistency and increase the possibility of error (Fletcher 1991). Defining dependence using basic activity rather than total activity provides a theoretically consistent foundation by which to rank and compare dependent communities. In a study by Fletcher (1991), forest industry dependence is measured as the proportion that the forestry sector contributes to the total economic

[6] The theory of central places provides a framework for understanding the hierarchy of communities. A community that serves a wide market area is higher up in the hierarchy because it serves lower order communities. This was first discussed by Christaller (1966), but Fletcher (1991) provides a brief description of the theory and the theory's relationship to defining dependence on basic sector activity.

base of a community. Thus, variations in the size of the non-basic sector do not influence dependence levels of communities of different sizes.

Fletcher utilizes the location quotient (LQ) measurement to estimate base employment and calculate forest industry dependence in the forested region of the prairie provinces.[7] The LQ method is a widely used tool for calculating basic activity and to operationalize the economic base model (Isserman 1977, Pleeter 1980).[8] Employment is most commonly used to calculate the location quotient, although income, sales, and value added are possible measurement units (Fletcher 1991).[9] Thus, an intuitive description of the LQ is the ratio of a community's share of employment in industry *i* to a benchmark region's (i.e., the province's) share of employment in the same industry. The location quotient can be written as:

$$LQ^i_j = [(E^i_j/E^T_j)/(E^i_p/E^T_p)] \qquad (1)$$

where:

LQ^i_j = community j's location quotient for industry *i*; where $i, j = 1....n,m.$
E^i_j = community j's employment in industry *i*
E^T_j = total employment in community j
E^i_p = provincial employment in industry *i*
and E^T_p = total provincial employment

---

[7] The forested region of the prairie provinces are represented by census subdivisions (CSD) within the following census divisions (CD): Alberta CD 3, 6, 9, 12-19; Saskatchewan CD 9, 14-18; and Manitoba CD 1, 2, 13, 14, 16-23.

[8] Pleeter (1980) and Fletcher (1991) provide an overview of alternative techniques used in measuring the economic base.

[9] Employment is commonly used to operationalize the model since employment data is available for studies of a large number of communities. Employment data is also relatively inexpensive to obtain compared to the costs of conducting a large-scale survey. Appendix 1 provides further discussion regarding census employment data with respect to calculating dependence.

The benchmark region is assumed to represent the level of employment needed to provide for domestic consumption. A location quotient greater than one indicates that an industry produces more than what is needed for local community consumption (i.e., more than the benchmark), and the excess is attributed to basic sector employment (Isserman 1977, Pleeter 1980). Thus, implicit in the calculation is the assumption that within any given industry per capita consumption and productivity per employee are identical to the benchmark's consumption and productivity levels (Isserman 1980, Pleeter 1980). In Fletcher's study, provincial levels of employment are used as benchmarks. Using provincial benchmarks reduces the likelihood that within any given industry per capita consumption and productivity per employee differ greatly from benchmark levels (Schwartz 1982).

Another assumption implicit in the LQ measure is that neither the community nor the benchmark region are net exporters or net importers for any industrial category. First, at the *community* level this is referred to as the homogeneous products assumption (i.e., within any industry *i*, the community and the province produce identical products), and implies that there is no need to export and import ("cross haul") within an industrial category. However in reality, cross-hauling does occur. For example, say a community specializes in wooden cabinet making (at the three digit, standard industrial category (SIC) #254), and is a net exporter of this output. Suppose also that the community is a net importer in products supplied by both sawmill industries (SIC #251), and veneer and plywood industries (SIC #252).

At the two digit SIC analysis (SIC #25 - Wood Industries) the community's excess share of employment at the cabinet making level is underestimated. Since the composition of products within an SIC tends to increase with aggregation (i.e., lower digit level), the location quotient measure of base employment will more accurately reflect the homogeneous products assumption if highly disaggregated data is used, say a three or four digit SIC level (Isserman 1977, Schwartz 1982).

Second, at the *benchmark* level, the assumption of no net exports or imports is what defines the province as "self-sufficient" (i.e., it consumes exactly what it produces). Where a province is a net exporter the location quotient overestimates employment necessary to provide local consumption at the community level, and community basic employment is underestimated. Where a province is a net importer community basic employment is overestimated (Schwartz 1982).

To adjust for the fact that the province both exports and imports to meet consumption demands, the province's share of industry employment is weighted by the proportion of benchmark output minus net exports (for that industry) out of total benchmark output (Isserman 1977). This modification is used by Fletcher (1991) to adjust provincial benchmarks to reflect only that output needed to meet domestic consumption.[10]

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[10] Input-output tables can be obtained from Statistics Canada's catalogue *The National Structure of Canada, 1990*. Ideally, provincial input-output data, if it were available at a three digit SIC, should be used to make this adjustment.

The equation for the modification is:

$$E^i_p* = [(T^i_n - X^i_n + M^i_n)/T^i_n)]\ E^i_p \qquad (3)$$

where

E^i_p* = the weighted share of employment needed for provincial self-sufficiency in a province where there are no net exports
T^i_n = total national output from industry *i*
X^i_n = national exports from industry *i*
M^i_n = national imports from industry *i*
E^i_p = provincial employment in industry *i*

Equation 1 can be re-written with the modifications as:

$$LQ^i_j = (E^i_j/E^T_j)/(E^i_p*/E^T_p) \qquad (3)$$

The LQ, as a technique for estimating basic employment has been criticized on empirical grounds (Greytak 1969, Gibson and Worden 1981). But criticisms were leveled at studies where high levels of aggregation were used, and benchmark adjustments (such as the above modification) were not applied. Measurement errors arise mainly because of assumptions implicit in the LQ technique. Further improvements to the LQ, generally depend upon improvements in the quality of data (Bendavid-Val 1991).

Given a positive LQ, the proportion of employment that is devoted to basic activity can be calculated as X^i_j:

$$X^i_j = [(LQ^i_j - 1)/ LQ^i_j]\ E^i_j \qquad (4)$$

Fletcher calculates forest industry dependence as the proportion of base employment in the forestry sector (which includes timber extraction and manufacturing industries, and related forestry services, see Appendix 2) to total base employment for each community. The ratio is called the forest dependence index (FDI)[11]:

$$FDI = (X^i_j/X^T_j) \qquad (5)$$

where X^i_j is basic forest industry sector employment and X^T_j is the total of all basic sector employment such that:

$$X^T_j = \sum_{i=1} X^i_j \qquad (6)$$

The FDI is interpreted as the proportion that the forest industry sector contributes to the economic base, and provides a means to rank communities by degree of forestry sector dependence. Fletcher avoids the arbitrary selection of forest industry dependence categories used in past studies. Instead, natural separations in the distribution of the FDI roughly guided by previously used cut-off levels are used to describe communities as heavily, moderately, or slightly forest industry dependent.

Fletcher's FDI provides a useful measure to identify, rank and compare communities whose basic forestry employment is vulnerable to impacts from changes in external markets or policy. Fletcher also provides evidence that the higher the FDI,

[11] Fletcher (1991) uses the term forest dependence index, but forest industry dependence index more accurately defines the measure, since employment is based on industrial timber extraction and manufacturing, and related forestry services.

for any size of forest industry dependent community, the greater the welfare impact (measured in income) from various shocks within the forest industry. This evidence is based on a general equilibrium model, and reinforces the premise that the FDI provides a priority ranking for reference in decision making.

Fletcher calculates FDI's for 1981 and 1986 using employment data at a three digit standard industrial classification (SIC) code. The census subdivision (CSD) is used as a proxy for 'community'. Although there are 708 census subdivisions in the prairie provinces, Fletcher omitted 185 Indian reserves and 180 rural districts (including communities with populations of less than 50 persons).[12] Thus, 333 CSD's were considered in Fletcher's forest industry dependence calculations.

Aboriginal forest dependence has been an area of neglect and major shortcoming of the research on forest industry dependent communities in Canada. Where some studies have ignored the contribution of forest-related subsistence activity to Aboriginal communities altogether, other studies have given the topic only cursory comment. Although there are difficulties associated with including subsistence activities into economic base measures of dependence (these problems are investigated in Chapter 4.0), excluding Aboriginal communities, or any community, from dependence calculations results in an under-estimation of the actual number of forest

[12] Rural districts is a general term for the geographic regions of: rural municipalities; local government districts; improvement districts; counties; rural municipalities; and unorganized subdivisions. Fletcher did not specify why the remaining 10 CSD's were omitted from the FDI calculations.

industry dependent communities. Quantitative evidence of this omission is provided in the following chapter.

Chapter 3.0. Including Indian Reserves, Rural Districts, and Transfer Payments in Economic Base Dependence Analysis

3.1. Rationale for the Inclusion of Indian Reserves, Rural Districts, and the Transfer Payment Sector in Forest Industry Dependent Calculations

In the forest industry dependence studies reviewed, Pharand (1988) and Steele (1988) include Indian reserves and Aboriginal communities in their analysis without acknowledging cultural differences affecting forest values between Aboriginal and non-Aboriginal people. Fletcher (1991) excludes Indian reserves from calculations of forest industry dependence due to Aboriginal people's treaty rights to transfer payments, and also due to cultural differences. Fletcher also excludes rural districts from his calculations on the basis that the population of these locales is too widespread to be considered cohesive communities.

Aboriginal communities and rural districts may be included in economic base calculations of forest industry dependence as long as certain acknowledgments and adjustments are made. Foremost, economic base forest industry dependence measures do not address the full nature of forest values and dependence in Aboriginal communities.[13] Economic base dependence focuses on monetary benefits to a

[13] This research focuses specifically on Aboriginal populations of the forested regions of the prairie provinces. Common among Aboriginal people is the traditional spiritual belief that there exists an interdependent relationship between the people and the land. Respect for this land-people relationship ensures the continued existence of Indian people, and lasting provisions from the land (Callicot 1989, Miller 1991). The Aboriginal people in the study region have different tribal affiliations, predominantly Woods Cree, Chipewyan, Denisuline, Saulteaux, and Métis. The belief of kinship with the land is similar amongst these tribes of the broad area of the western subarctic (Friesen 1984). This is not to say that the non-Aboriginal (Euro-Canadian) residents of the study area have not developed a cultural bond to the forest (Muth 1990, Kusel 1995). Nevertheless, such

community's economy, and does not address non-market values of the economy's participants (Alward *et. al.* 1992). However, given the role of the subsistence activities in providing "in-kind" income in many Aboriginal communities, the subsistence economy should be evaluated and included in measures of economic base dependence. This subject is investigated more fully in Chapter 4.0.

Aboriginal communities in the forested regions of the prairie provinces are sufficiently numerous and large that their exclusion from general surveys of economic base dependence represents a significant omission. Most northern prairie province Indian and Métis communities are located in, or near, the boreal forest (National Aboriginal Forestry Association 1993). The Aboriginal population contributes considerably to the total population in the forested regions for both 1986 and 1991 (see Table 3.1.1.). Over the five year period, the Aboriginal population in all three provinces has increased.

Table 3.1.1. Changes in Aboriginal and Non-Aboriginal Population, Forested Region of the Prairie Provinces, 1986 and 1991

Province	Alberta		Saskatchewan		Manitoba	
Year	1986	1991	1986	1991	1986	1991
Population						
Total	1,096,100	1,199,006	275,503	264,979	227,982	232,490
Aboriginal	58,770	77,870	41,495	49,225	44,681	48,770
Non-Aboriginal	1,037,300	1,121,136	234,008	215,754	183,301	183,720
Aboriginal pop.						
% of total	5.4%	6.5%	15.1%	18.6%	19.6%	21.0%
% Change 1986 to 1991						
Aboriginal		32.5%		18.6%		9.2%
Non-Aboriginal		8.1%		-7.8%		0.2%

Source: Statistics Canada. Profile Series - Part B. Ottawa 1986, 1991 Census of Canada.

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bonds are uniquely defined by each culture, and the focus here is on Aboriginal cultural adaptations to the land.

Many Indians and Métis (living both on and off reserves) are employed by the forestry industry. Identifying timber dependent Aboriginal communities can indicate where industrial forestry sector activities support or compete with the bush harvest economy.[14]

Rural districts may also be included in surveys of economic base dependence. These census subdivisions (CSD's) may vary in size (population and area), and nature of economic development. However, in some cases rural districts may be more economically developed and politically organized than neighboring towns. Regardless of the geographical spread of the population, excluding these CSD's excludes a large part of the employed population. Ideally, in terms of policy and management decisions, all potentially affected forest industry dependent CSD's should be identified.

An important adjustment to the economic base forest industry dependence measure is the inclusion of income from transfer payments. For this study, transfer payments are broadly defined as any source of income other than employment income, such as pensions, unemployment income, investment income, etc. Calculations of the economic base which exclude transfer payments ignore individuals who receive external flows of funds as a sole source of income (Schwartz 1982). Omitting transfer payments tends to overestimate the contribution to the economic base from employment sectors. Transfer payments provide an important source of income to many Aboriginal and non-Aboriginal communities, and should be included in the

[14] Reference to the bush harvest economy includes subsistence activities (for domestic consumption), and other bush activities such as commercial trapping, fishing, and sales of traditional arts and crafts.

measure of economic base dependence for all communities. The following section provides an explanation of how the transfer payment data for the forested region of the prairie provinces is obtained and included in the LQ and dependence measures.

3.2. Transfer Payment Data

Based on census categories, the number of people who rely solely on transfer benefit income is estimated by subtracting the number of people who collect employment income from the number of persons who collect income. Statistics Canada provides a count of the total number of people, 15 years and older, who receive income.[15] Statistics Canada also categorizes and counts the number of people who collect employment income.[16] Data for the calculation of the transfer payment sector was obtained from the 1991 census. Transfer payment data is available for communities with populations of 250 persons and up. Statistics Canada suppresses income data in smaller communities to ensure confidentiality.

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[15] Statistics Canada includes as income: wages and salaries; net income from unincorporated non-farm business and/or professional practice; net farm self-employment income; old age security pension and Guaranteed Income Supplement; benefits from Canada or Quebec Pension Plan; family allowances; federal child tax credits; benefits from unemployment insurance; other income from government sources; investment income; retirement pensions, superannuation and annuities; and other money income - cash income received and not reported under the sources listed (Statistics Canada Cat. no. 95-366).

[16] Employment income is defined as: wages and salaries; net income from unincorporated non-farm business and/or professional practice; and net farm self-employment income (Statistics Canada Cat. no. 95-366).

In this study, transfer payment calculations are based on the number of people receiving transfer income. The problem with this approach is that there is a wide variability in the amount of income received from different types of transfer payments. Similarly, using transfer payment recipients implies that the income from transfer payments does not greatly differ from the income received for wage employment. This does not accurately reflect the fact that income received from transfer payments differs in amount depending on its source.[17] Pensions and unemployment insurance payments are typically less than income received from previous employment. Income as a unit of measurement, instead of number of persons receiving transfer income, would more accurately capture the differences in income between wage and transfer payment sectors. However, for the sake of comparison to Fletcher's (1991) study that uses employment data, the number of transfer payment recipients is used here.

Once the number of transfer payment recipients is obtained for the CSD's it is included as a sector, similar to the employment sectors listed in Appendix 2. The share of transfer payment recipients in the CSD is compared to the share of transfer payment recipients in the province, as per the LQ measure. If the LQ is positive, then basic transfer payment activity is calculated.

[17] Distinguishing the various transfer income categories would better specify the nature of transfer payment dependence. For example, if dependence on pension income is predominant, this defines a quite different community than one that is dependent on unemployment insurance income. Deriving a dependence measure that characterizes this difference presents a topic for future research.

3.3. Results

The following sections provide a summary of the results from three separate calculations of the FDI for forest industry dependent communities of the prairie provinces. First, the FDI is updated using 1991 data, and Fletcher's definition of community (i.e., excludes Indian Reserves and rural districts). The results are compared to Fletcher's 1986 FDI results. Second, the 1991 FDI results (and narrow definition of community) are compared to a recalculated FDI that expands the definition of community to include Indian reserves and rural districts. Last, the FDI (with the broader definition of community) is compared to a recalculated FDI (again with the broad definition of community) that includes the transfer payment sector.

3.3.1. Forest Industry Dependent Communities, Excluding Indian Reserves, Rural Districts, and Transfer Payments, 1986 and 1991

Employment data at the three digit SIC for 683 census subdivisions in the forested region of the prairie provinces was obtained from Statistics Canada.[18] Of the CSD's there are 183 Indian reserves and 169 rural districts. There are twenty-one CSD's with populations less than 250 that are excluded from the 1991 FDI results.[19] Thus there are 310 "communities" as defined by Fletcher (1991). The total number of

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[18] Three digit SIC employment data is available by special order from Statistics Canada. The data ordered for this study is based on the 1991 Census of Canada.

[19] For consistency with available transfer payment data, and for the purpose of comparison, populations of less than 250 persons are excluded from all 1991 FDI calculations, as well as from Fletcher's 1986 FDI results.

forest industry dependent communities (and total population) for categories of heavy, moderate and slight dependence by province are listed below in Table 3.3.1.1. A full list of forest industry dependent communities for the 1991 calculation is provided in Appendix 3, Table 3.1. Categories of heavy, moderate and slight forest industry dependence are designated based on natural breaks identified in the 1991 FDI results (the largest differentials between FDI's), and guided by cut-off levels used in other studies.[20]

Table 3.3.1.1. Forest Industry Dependent Communities, Excluding Indian Reserves and Rural Districts, 1986 and 1991

Province	1986*		1991	
	number of communities	population	number of communities	population
	Heavy forest industry dependence			
Alberta	0	-	1	1,692
Saskatchewan	1	2,133	1	1,868
Manitoba	1	724	2	6,902
Total	2	2,857	4	10,462
	Moderate forest industry dependence			
Alberta	8	50,624	8	29,278
Saskatchewan	1	815	5	2,957
Manitoba	1	6,283	2	8,520
Total	10	57,722	15	40,755
	Slight forest industry dependence			
Alberta	11	32,041	28	97,751
Saskatchewan	11	44,888	9	42,577
Manitoba	3	10,838	5	14,915
Total	25	87,767	42	155,243

*Source: Fletcher (1991) and for population numbers 1986 Census (Statistics Canada).

In all three categories of dependence, the number of forest industry dependent communities (FDC's), and their associated populations, have increased. Much of the

[20] This method used for defining categories is the same as was used by Fletcher. Interestingly, when the breaks derived from the 1991 were used on Fletcher's 1986 results, the number of FDC in each category did not change.

increase can be attributed to a large number of new FDC's in Alberta. The Alberta government's policy has focused on development of the forestry industry since the early 1980's. Between 1986 and 1989 four new pulp mills began operations in Alberta (in addition to the single existing pulp mill). The rise in forest activity has increased the total number of FDC's (in all categories) in Alberta from nineteen in 1986 to thirty-seven in 1991.

In Saskatchewan, two new mills came into operation (a paper mill in 1990, and a pulpmill in 1991) over the five years between census surveys. Activity did increase in the area of the two pulp mills causing eight new communities to be considered forest industry dependent. But the total number of FDC's did not increase greatly (from thirteen in 1986 to fifteen in 1991) in the province because six communities previously considered slightly forest industry dependent fell from the ranks. Of the six communities that fell from the dependence ranking, most communities had only a small percentage of persons employed in basic forest industry activity in 1986.

Manitoba has nine FDC's in 1991, compared to five in 1986. Manitoba's communities reflect a similar situation to Saskatchewan, with two pulp mills dominating two general areas. Both mills were established before 1986. Since, four sawmill-planing complexes began operations (Giles and Bohning 1992). Manitoba's forest products exports increased in 1986 and remain fairly stable until 1989 (Canadian Forest Service 1992). These factors have contributed to an increase in the number of FDC's in the area near the mills.

3.3.2. Forest Industry Dependent Communities, Including Indian Reserves and Rural Districts, 1991

There are 613 census subdivisions (CSD's) in the prairie provinces when Indian reserves and rural districts are included in the analysis: 134 enumerated reserves, plus 479 CSD's (49 reserves were omitted because they were not enumerated). Table 3.3.2.1 below, compares the 1991 forest industry dependence index (FDI) calculation, which exclude Indian reserves and rural districts, to the 1991 FDI calculation that includes all CSD's[21] (refer to Appendix 3, Table 3.2 for a full list forest industry dependent CSD's).

Table 3.3.2.1. The 1991 FDI Calculated With and Without Indian Reserves and Rural Districts

	1991		1991	
	FDI - excluding Indian reserves & rural districts		FDI - including Indian reserves & rural districts	
Province	number of communities	population	number of communities	population
	Heavy forest industry dependence			
Alberta	1	1,692	1	1,692
Saskatchewan	1	1,868	3	4,605
Manitoba	2	6,902	5	12,752
Total	4	10,462	9	19,049
	Moderate forest industry dependence			
Alberta	8	29,278	15	53,270
Saskatchewan	5	2,957	9	12,928
Manitoba	2	8,520	8	14,920
Total	15	40,755	32	81,118
	Slight forest industry dependence			
Alberta	28	97,751	39	154,275
Saskatchewan	9	42,577	21	55,367
Manitoba	5	14,915	21	58,596
Total	42	155,243	81	268,238

[21] Recall from footnote 19 that FDI calculations include CSD's with populations of 250 persons or more.

With the inclusion of Indian reserves and rural districts, nine CSD's are considered heavily forest industry dependent. The near doubling of the number of heavily FDC's equates to an 82 percent increase in the population of those communities.

Table 3.3.2.1. shows fifteen moderately FDC's as defined by Fletcher, compared to thirty-two CSD's when Indian reserves and rural districts are included. Both the number of moderately FDC's and moderately dependent population almost double. Of the seventeen communities previously excluded from the moderately dependent category seven are Aboriginal communities. Aboriginal communities make up about 3.4 percent of the total population in the moderately forest industry dependent group.[22]

Only 57.8 percent of the population in the slightly dependent communities is accounted for when Indian reserves and rural districts are excluded. Including all CSD's boosts the slightly dependent population to 268, 596, and the total number of slightly FDC's to eighty-one. Of these, eleven CSD's are Aboriginal communities: five from Manitoba, six in Saskatchewan, and one Alberta reserve. The eleven Aboriginal communities account for 3.2 percent of the total slightly forest industry dependent population.

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[22] This calculation does not account for Aboriginal people living in communities not identified as Aboriginal communities. Nine Aboriginal communities with populations between 50 and 250 persons were calculated to be forest industry dependent, but were omitted from the calculations.

This analysis highlights the importance of including all communities in forest industry dependence studies. The total number of FDC's (in all categories) doubles with the inclusion of Indian reserves and rural districts. The total forest industry dependent population increases by 78.4 percent. Including all CSD's provides a more complete spatial analysis of the forested region's population. This more inclusive definition of community identifies areas of forest industry dependence that are missed by the narrower definition of community. Many Indian reserves and rural districts are located on or near the periphery of communities with established timber industry operations. Some more distant CSD's are supported by smaller operations or logging contracts. The point of including all CSD's is that the effects of shocks to the forest industry products sector are more widespread than identified by a more exclusive definition of community, such as the one used by Fletcher (1991).

3.3.3. Forest Industry Dependent Communities, Including Indian Reserves, Rural Districts, and the Transfer Payment Sector, 1991

In every community considered in this study, there are some individuals receiving some form of transfer income. Evidence of this is shown in the increase in total basic activity in all communities with the inclusion of transfer payments, as shown in Appendix 3, Table 3.3. The increase in the total basic activity causes forestry, and all other basic sectors, to make up a smaller proportion of total basic activity. As a

result all FDI's fall, and the total number of FDC's also falls. The last data set, presented in Table 3.3.3.1. below, shows the results of calculating the FDI (all CSD's of populations of 250 persons and greater included) with and without a transfer payment sector.

Table 3.3.3.1. The Forest Industry Dependence Index Calculated With and Without the Transfer Payment Sector, for All Census Subdivisions, 1991

	1991		1991	
	FDI - calculated without Transfer Payment Sector		FDI - calculated with Transfer Payment Sector	
Province	number of communities	population	number of communities	population
	Heavy forest industry dependence			
Alberta	1	1,692	0	0
Saskatchewan	3	4,605	2	2,169
Manitoba	5	12,752	1	6,166
Total	9	19,049	3	8,335
	Moderate forest industry dependence			
Alberta	15	53,270	10	40,862
Saskatchewan	9	12,928	5	12,018
Manitoba	8	14,920	9	16,032
Total	32	81,118	24	68,912
	Slight forest industry dependence			
Alberta	39	154,275	34	128,221
Saskatchewan	21	55,367	20	54,685
Manitoba	21	58,954	18	50,680
Total	81	268,596	72	233,586

In the heavy forest industry dependent category the number of communities falls from nine to three CSD's. The drop in communities equates to about a 56 percent drop in forest industry dependent population in this category. The remaining six CSD's fall from heavy dependence to the moderately forest industry dependent status.[23]

[23] Appendix 4 provides a list of the FDI's for all communities calculated without and with the transfer benefits sector.

In the moderate forest industry dependence category the number of communities also falls. The drop in population in this category is 15.1 percent. In the slight forestry dependence category there is the least change in both number of communities and population. The number of slightly forest industry dependent communities falls by nine, and population decreases by 13 percent. In total twenty-three communities fell from the forest industry dependence categories altogether.

Communities with a large proportion of basic transfer income recipients out of the total economic base are actually less dependent on basic forest industry employment than implied by FDI calculations that exclude the transfer payment sector. The transfer payment sector helps to diversify the economic base of communities. For some communities, the economic base is made up of a single basic resource sector and a transfer payment sector. If the resource sector is affected by a negative shock, dependence on the transfer payment sector, the only other external income source, would increase. There are serious implications for such communities should negative shocks to the transfer payment sector occur as a result of policy decisions. The effects of the new Employment Insurance Program (as of June 1996) on changes in dependence in FDC's presents a topic for further research.

Including the transfer payment sector in dependence calculations provides a more complete profile of the economic base of communities potentially affected by a change in the forest industry products markets, timber supply and forest policy. This

too could be improved in future research efforts, by differentiating social assistance from investment and pension income.

Overall, omitting Indian reserves and rural districts from calculations of forest industry dependence underestimates the number of FDC's in the prairie province region. However, including Indian reserves and rural districts but omitting the transfer payment sector tends to overestimate the degree of forest industry dependence, and hence the number of forest industry dependent communities. A more accurate listing of the number of forest industry dependent communities is generated from the FDI if all communities and transfer payments are included. However, Aboriginal communities' dependence on the subsistence economy remains an issue, and if omitted from the analysis represents an underestimate of forest-related activity and dependence.

Chapter 4.0. Defining Subsistence According to Economic Base Theory: Implications for Forest Policy

Whereas the inclusion of the transfer payment sector into the FDI is reasonably straightforward, adapting the economic base dependence measure to include the subsistence economy presents more of a challenge. Important theoretical issues regarding how subsistence is to be defined, in terms of non-basic and basic sector activities, need to be examined if the subsistence economy is to be included into an economic base measure of dependence.

The economic base method of measuring basic and non-basic activity focuses on the income or activity from market exchanges of locally produced goods and services that accrue to local residents (Schwartz 1982, Blair 1991). However, calculations of a community's economic base that use total income (or equivalent proxies such as employment) do not capture the non-market transactions associated with non-market production. As a result, the contribution of subsistence production in raising the total value of production within a community is ignored.

The value of subsistence contributions to the total economy can be quantified in terms of in-kind income, and included as part of the community's total income. By including subsistence, the community's income is raised above estimates based on measures of cash income alone. The question of interest here is: can subsistence be defined according to the basic/non-basic sector criteria and included in economic base

measures of dependence? This is important since many Aboriginal communities depend on the forest for the income in-kind contribution from the subsistence economy.

4.1. The Importance of the Subsistence Economy in Aboriginal Communities in the Northern Prairie Provinces

In the 1960's and 1970's, research focused on the welfare of Aboriginal residents living on reserves in the prairie provinces. Reports were concerned with wage income and employment. In a study on the quality of life in native communities in the Canadian provinces, Riffel *et. al.* (1972) assert that transfer payments held residents captive in otherwise uneconomic conditions. However, no reference is made to the attainment of in-kind income from subsistence activities. Nor do the authors mention any possible cultural or social preference to live in a location where subsistence can be practiced and has been practiced for generations. Of the early research that documents the bush economy in northern Saskatchewan, subsistence activities are limited to commercial trapping and fishing (Buckley 1962), and subsistence for domestic consumption is not considered.

In the latter part of the 1970's, research began to focus on domestic consumption and dependence on subsistence harvest. Much of this research was undertaken in response to non-local industries' proposals to develop northern resources, and the possible conflict over land use. Several such studies focused on the

impact from: the James Bay Hydro Electric development in northern Quebec (James Bay and Northern Quebec Native Harvesting Research Committee 1982); the hydro-electric installation at Wintego Rapids on the Churchill river in northeastern Saskatchewan and northwestern Manitoba (Mitchell 1975, Ballantyne *et. al.* 1976, Schindelka 1978); uranium development in north-central Saskatchewan (Institute of Northern Studies 1978); and socio-economic effects of resource development on native communities in western Canada (Waldram 1988). These studies report an active subsistence economy in many Aboriginal communities.

More recent research has been initiated by Indian and Métis peoples in conjunction with traditional land claims, or to avoid conflicting land and resource management issues. These recent studies apply more rigorous methods to assess subsistence activity of native inhabitants of Alberta (Wein *et. al.* 1991)[24], Saskatchewan (Tobias and Kay 1992), Manitoba (Northern Manitoba Economic Development Commission 1992), and Ontario (Berkes *et. al.* 1994).

Recently, traditional harvest survey (THS) data was collected for 1992 harvest rates for First Nations communities in Saskatchewan in response to co-management initiatives between Mistik Management Ltd. and the Meadow Lake Tribal Council.[25] For the purpose of recalculating the FDI to include subsistence activity, the THS data

[24] Wein *et. al.* (1991) estimates individual food consumption of country foods, and does not estimate an in-kind value. Emphasis is on nutritional, rather than monetary, value of subsistence products.
[25] Mistik Management Ltd. is a private, non-profit firm responsible for timber management of NorSask's Forest Management Licensing Agreement.

is used to estimate in-kind income for an Aboriginal community in Saskatchewan.[26]

In-kind income is estimated by using replacement values. Replacement values are obtained by imputing prices using the closest substitutes to harvest products that are available in the nearest market (Usher 1976, Quigley and McBride 1987, Berkes *et. al.* 1994). Using this approach, in-kind income is estimated to be about one quarter of the 1991 total community economy of Waterhen, Saskatchewan. This amounts to approximately $4, 450 per household. This is a sizable contribution in a community where average household income (based on wage and transfer payment income and excluding in-kind income) is estimated to be $13, 184 (Statistics Canada 1993b). This amount lies within the range of other studies' calculations of in-kind income. Tobias and Kay (1992) estimate average annual (1983/84) in-kind income in Pinehouse, Saskatchewan to be $5, 710 per household. Berkes *et. al.* (1994) estimate average annual (1989/90) household in-kind income to be $8, 400 for eight communities in the Hudson and James Bay Lowland, Ontario. In Northern Manitoba, a regional, annual (1983/84), estimate was $1,167 per household (Wagner 1985).

Studies of remote communities in the more northern prairie provinces recognize that available wage income alone (usually from resource industries) provides for marginal living where distance raises the cost of living (Bone and Green 1986). The contribution of the yearly subsistence harvest to the local economy partly enables continued residence in remote resource-based regions where employment tends to be

[26] Appendix 5 provides the method used to calculate an estimate of in-kind income, and Section 4.2.3. is an evaluation of the FDI with the subsistence sector included.

impermanent. The coexistence of the wage and subsistence economy has been identified as vital in sustaining Aboriginal communities (George 1989, Tobias and Kay 1992, Berkes *et. al.* 1994).

4.2. Theoretical and Policy Considerations for the Forest Industry Dependence Index of Including the Subsistence Economy

The theory of the economic base focuses on the flow of income (or employment) between a community and its trading partners, and how the community is affected by changes in this flow. At the community level, the economic base concept of total community income is similar to disposable income as defined in the national accounting system (Schwartz 1982). Income is calculated as the payment to resident factors of local production and transfer payments from both public and private sectors minus personal taxes and other transfers to the government (Schwartz 1982).

Subsistence products are generally not traded in markets, and therefore are not captured by measures of income flows. If subsistence output was translated to in-kind income measures and included in community income accounts, the equilibrium level of community income would be higher than when based on the level of cash income alone.

Economic base theory accounts for flows of income as either inflows of income from external sources (basic activity), or as local income flows (non-basic activity). To include subsistence activity requires allocating in-kind income into the

non-basic and/or the basic sector; this is discussed in the next section. To whichever sector subsistence activities are allocated, the assumptions regarding the relationship between the basic and non-basic sectors must hold with the inclusion of subsistence activity. Specifically, non-basic activity depends upon the basic activity, such that an increase (or decrease) in basic employment leads to an increase (decrease) in non-basic employment. The effects on this relationship are investigated when subsistence is considered to be part of the non-basic sector (Section 4.2.1), or as part of the basic sector (Section 4.2.2).

4.2.1. Subsistence Activities as Non-basic Activities

There are characteristics of subsistence activities that would lead one to assume that all subsistence activity should be allocated to the non-basic sector. Subsistence is defined as activity that produces output solely for domestic consumption. There are no formal, external markets, or export of subsistence products. Since there are no exports of subsistence goods, it could be assumed that there is no basic subsistence activity. However, there may be problems with assuming that subsistence activities belong to the non-basic sector.

The addition of subsistence to the non-basic sector implies that subsistence sector activity *depends* on the basic sector to occur. This means that as the basic sector increases (or decreases), the multiplier effects on the non-basic sector activities (including subsistence activities) are direct, and therefore increase (or decrease) along

with the change in the basic sector. The main criticism of this argument is that the relationship between the basic sector and subsistence (as non-basic activity) is not known. Thus, the strictly direct basic/non-basic relationship as suggested by economic base theory does not hold when subsistence activity is included as non-basic activity.

For example, an increase in basic forestry employment directly causes a first round of increased employment and income in the short run. The increase in employment and income in the community may have a positive and/or negative influence on "non-basic" subsistence activity. An increase in income may have a direct effect as suggested by economic base theory. More income may result in an increase in the number of subsistence harvesters. Inputs to modern subsistence production are typically obtained through cash purchases, and otherwise willing participants can be constrained by a lack of funds to cover harvesting costs. An increase in wage employment enables those who previously could not afford to go out on the land, to participate in harvesting activities. Several studies reveal that in communities where subsistence is practiced, increases in wage employment has not led to a decrease in harvest activity, and in some cases the number of harvest participants increased (Condon *et. al.* 1995, George *et. al.* 1995). It is also possible that an increase in wage income may go towards upkeep or replacement of harvest equipment (i.e., new snowmobiles, trucks, boats or other harvesting equipment) for those already engaged in subsistence production. Active harvest involvement is dependent upon the cash for repairs to maintain reliable equipment and supplies (George *et. al.* 1995, Condon *et.*

al. 1995). A hunter might be "grounded" if a lack of funds restricts equipment repairs (Condon *et. al.* 1995).

It is possible that an inverse relationship exists between the basic/non-basic sectors that remains unexplained by economic base theory. Employment may reduce the time available for participation in subsistence activity. There were several individual responses to the traditional harvest survey (THS) in Saskatchewan (Appendix 5) who responded that working full-time left no time to engage in seasonal subsistence practices. However, some studies suggest that although the number of people participating in subsistence may decrease as a result of increased employment, the harvest quantity may not. Harvest quantities may remain stable as tasks and funds become reallocated, to intensify the effort of those remaining in harvest production (Wolfe 1987, Elias 1991, Tobias and Kay 1992).

It is also possible that an increase in basic employment (and income) may support a preference to purchase store-bought harvest substitutes, and possibly reduce the demand for subsistence products, and the need to participate in harvest activities. There is some evidence that the younger generation exhibits a temporary dietary preference choice for "convenience foods"; however this does not accurately reflect preferences for the entire population (Wein 1989, Condon *et. al.* 1995).

An increase in basic sector employment will negatively affect the ability to engage in subsistence activities if over the long-term it results in a decrease or loss in the skills and experience related to subsistence harvesting. If the skills needed for

participation in the subsistence economy are reduced, the diversifying influence of the subsistence sector on the local economy will also be diminished. Further, a permanent decrease or the demise of the subsistence sector may be interpreted as a loss of traditional culture, and as such will have negative implications for the social well-being of the community (Elias 1991, Condon *et. al.* 1995).

Generally, the effects of wage employment on community subsistence participation cannot be predicted by the direct relationship between basic to non-basic activities in the economic base model. Although there is some relationship between harvest activities and the cash economy, it is not fully captured by allocating subsistence to the non-basic sector. It is difficult to estimate the extent that subsistence activity relies on inflows of external income (for example, to meet production costs of subsistence activity). The effects of wage employment on the budget and time constraints of, and preferences related to, subsistence activity present empirical questions for further research.

Perhaps most importantly, allocating subsistence to the non-basic sector leads to the implied assumption that a community would never be considered dependent upon forest-related subsistence activities. This incongruous result does not aptly describe communities where subsistence contributes significant in-kind income to the total income accounts of the economy (as discussed in Section 4.2). Nor does it describe how the subsistence economy works to diversify the local economy by providing an alternative or supportive means of income when jobs are scarce or

limited. Overall, it seems inappropriate to define subsistence activity as non-basic activity. Subsistence activity as basic sector activity is examined in the following section.

4.2.2. Subsistence Activities as Basic Activities

Subsistence activity does not fit the general definition of basic activity either; subsistence does not create an inflow of cash income from external sources since is it not motivated by external demand. However, under certain conditions, subsistence production functions similarly to import substitution[27], and can increase the local multiplier (as associated with a change in basic activity) by decreasing income leakage from the community. The circumstances required for subsistence activity to increase the local multiplier is first, that subsistence harvest output replaces food products that are non-local (i.e., imported) purchases. Thus, subsistence production provides goods that must otherwise be imported. Also, subsistence production enables consumers to spend their income on a wider variety of non-food goods (income otherwise spent on food purchases). This leads to the second condition that these additional non-food goods are purchased locally. Combined, these two conditions will lead to an increase

[27] Subsistence activity is partially motivated by the relatively high cost of store bought alternatives (Bone and Green 1986, Wein *et. al.* 1991), as well as for the preference for locally harvested bush foods (Wein *et. al.* 1991, Condon *et. al.* 1995). These factors provide an impetus for import substitution to occur (Blair 1991).

in the local multiplier by causing a reallocation of cash expenditures from non-local to local.

Such conditions do not describe the usual circumstances in remote Aboriginal communities. Subsistence activity replaces a proportion of expenditure that might otherwise go to the local grocery store, an economic activity that is perhaps reasonably common among small towns. Also, given the typically limited variety of goods and services in remote communities it is likely the non-food purchases are made outside the community (Berry and Parr 1988). This combination of factors, subsistence activity replacing a local service and a reallocation of expenditures from local to non-local, results in an income leakage from the community that dampens local multiplier effects.[28]

The possibility that subsistence production functions to increase the local multiplier is not enough evidence to support the assignment of subsistence activity to the basic sector. Perhaps the most significant theoretical argument for excluding subsistence from the basic sector is that subsistence production does not produce an inflow of cash, even though it increases the total amount of income from all sources (including in-kind and cash income) in the community. Rather, subsistence production tends to affect how inflows of cash income are distributed. Understanding how

[28] Other possible combinations are: subsistence replaces local food purchases and alternative expenditures are also local; and subsistence replaces non-local food purchases and alternative expenditures are also non-local. In both these cases the local multiplier is unaffected.

subsistence activity affects local and non-local expenditures is a topic worthy of further research.

Given the diversifying influence of the subsistence sector on the local economy it would be useful to include it in an economic measure of dependence. Restricting the economic base dependence measure to a descriptive analysis allows the inclusion of subsistence activity, and provides a more realistic analysis of the potential diversity of the economic base. However, given that subsistence sector does not accurately fit the definition of basic activity, it is unknown whether the economic base dependence measure (with subsistence included) would still provide a method of ranking the welfare effects of economic shocks to communities. The following analysis of the FDI with subsistence included should be interpreted in light of these uncertainties.

4.2.3. The Forest Dependence Index Calculated to Include the Subsistence Sector as Basic Activity: A Case Study in Waterhen, Saskatchewan

In this section, subsistence activity will be treated as basic activity and included in the dependence measure. Detailed, subsistence harvesting data is rare at the community level. Therefore, FDI calculations including the subsistence sector for all Aboriginal communities in the prairie provinces is not possible. However, harvest data was available in Waterhen SK., and permission to use this data was obtained from the

Waterhen First Nation. Including the subsistence sector when calculating dependence is similar to the approach used to include the transfer payment sector. Given that the FDI calculation deals with employment numbers, it is necessary to express subsistence activity in terms of persons.

One approach to deriving an employment equivalent to subsistence activity is to add up the hours spent harvesting, weight the total hours by the percentage of full and part time employed, and divide by full and part-time hours to arrive at number of full and part-time persons. According to census estimates, there are approximately 30.5 percent full time, and 69.5 percent part-time persons, out of total employed persons. Based on THS responses 9, 418 days were spent on the land over the year. This number was calculated by assigning average values of time spent to respondents that indicated harvesting involvement but did not indicate time spent. There are 260 and 130 working days associated with full and part time work respectively.

$$\frac{(.305)\,(9418)}{260} = 11.05 \text{ (number of persons working full-time)}$$

$$\frac{(.695)\,(9418)}{130} = 50.35 \text{ (number of persons working part-time)}$$

The estimate of number employed based on the THS estimates of time spent on the land is equal to 61 persons.

A problem associated with this calculation is that the harvest surveys provided data pertaining to time spent harvesting on a per species basis, and as a result, double counting is a problem. Double counting occurs because many people report being

engaged in more than one harvesting activity while out on the land. Future survey instruments should be structured to avoid double counting, so that estimates of time spent harvesting could produce more useful results.

Because of the potential double-counting problem, the chosen alternative is to calculate the number of employed persons it would take to produce a wage income equivalent to the estimated value of in-kind income. This can be interpreted as an *imputed* number of employed associated with the subsistence sector, given that the number of persons required to harvest a given volume is not readily known.

In-kind income is divided by a weighted average of full and part time income per employee to arrive at the number of subsistence participants. The weighted average of full and part time income per male and female employee equals $11, 828.10 (Statistics Canada 1993b). The calculation of weighted average annual income for part and full time employment for Waterhen, SK. is as follows:

Number of full time persons:
males = 9 females = 23

Number of part time persons:
males = 46 females = 27

Average full time income:
males = $15, 624 females = $16, 751

Average full time income:
males = $7, 214 females = $7, 236

Weighted average male and female full time income:
$15,624(0.2813) + $16,751(0.7188) = $16, 434,03

Weighted average male and female part time income:
$7,214(0.6301) + $7,236(0.3699) = $7, 222.16

Average of weighted full and part time income per employed person:
($16, 434,03 + $7, 222.16) / 2 = $11, 828.10

To derive the number of wage-employed individuals necessary to produce income equivalent to the estimated value of the subsistence harvest, in-kind income ($672, 365.93 refer to Appendix 5) is divided by the weighted average of annual income per employed person for Waterhen, SK. The calculation is:

In-kind income divided by weighted average of income:

$$\frac{\$672,365.93}{\$11,828.10} \simeq 57 \text{ persons}$$

The resulting number of persons associated with subsistence activity equals 57 persons.

To calculate dependence, the imputed number of subsistence participants in Waterhen, SK. is aggregated with basic employment and basic transfer payment recipients, to arrive at total basic activity.[29]. Basic sector dependence is calculated the same as the FDI as the ratio of sector activity out of total activity. Several FDI measures for Waterhen, SK. are computed and listed in Table 4.2.3.1.

Table 4.2.3.1. FDI With and Without the Subsistence and Transfer Payment Sectors Included: Waterhen Reserve, Saskatchewan, 1991

	FDI	FDI*	FDI**
Waterhen, SK.	0.1981	0.083	0.0648

FDI: forest industry dependence index excluding transfer payment and subsistence sectors
*FDI: forest industry dependence index including the transfer payment sector
**FDI: forest industry dependence index including the transfer payment and subsistence sector

[29] Double counting is a problem when aggregating subsistence participation with employment and transfer payment recipients. Statistics Canada's employment numbers do not account for multiple jobs. Individuals engaged in subsistence may also be employed, or collect transfer payment income. Thus the FDI results in Table 4.2.3. are not comparable to other FDI calculations. A more accurate measure of basic activity dependence would account for multiple sources of income.

Where just wage employment is considered in the first column in Table 4.2.3.1, Waterhen is considered moderately forest industry dependent according to the cut-off levels. When transfer payment recipients are included, Waterhen is considered slightly forest industry dependent, at FDI equal to 0.0830. Dependence on the transfer payment sector however, is quite high at 0.7785 (refer to Appendix 3, Table 3.3). If both the transfer payment and subsistence sector are included (column 3, Table 4.3.2.1) Waterhen is not considered forest industry dependent. Dependence on the transfer payment sector is lessened to 0.5057, and subsistence sector dependence is estimated to be 0.3874. The diversifying influence of including the subsistence sector diminishes the estimated contribution to the total base economy from the forestry and transfer payment sectors.

4.3. Economic Basic Measures and Inter-sectoral Effects of Market and Policy Shocks

In addition to the problems associated with including subsistence with respect to the basic/non-basic dichotomy, another problem arises. Economic base analysis does not capture the inter-sectoral effects of a potential displacement of resources where sectors share inputs to production (Schwartz 1982). The subsistence and industrial forestry sector share natural (the forest) and human resources in production. As a result, the effects of market and policy shocks within the forest sector may have

different impacts that, in the extreme, may permanently impair a community's ability to participate in the subsistence sector.

Economic base analysis captures market changes as it affects employment and income. In the event of a market shock, such as a fall in the world price of timber, the demand for labour inputs to production lessen, and consequently causes a decrease in the level of basic activity. The indeterminate effects of a change in industrial forestry employment on subsistence participation were discussed in Section 4.2.1 as it pertains to the basic/non-basic relationship, and are equally applicable to inter-sectoral relationships. Fluctuations in the forest industry market, such as decreases in the prices of forestry products, cause a decrease in forest industry employment and income. However, a temporary market shock may not significantly affect a community's ability to participate in subsistence. Instead, in the event of lost employment and income in the forestry sector, the subsistence sector may act to diversify the total economy by providing an alternate form of activity and in-kind income support.

Forest-related policy shocks, on the other hand, may affect the land base that is shared by both industrial forestry and subsistence in production. At a minimum, policy shocks, such as the allocation of a new forest management agreement (FMA) or an increase in annual allowable cut (AAC), increases the intensity of use on a given forest management land base and may affect the area available for subsistence use. Many subsistence harvesters have stated that timber harvesting activities scare off game,

destroy available habitat, and increase access to both local and non-local hunters. These are issues that forest industries and First Nations people are currently trying to address through alternative forest management regimes. The problem with using economic base analysis alone to estimate the shock of policy change is that the benefit of an increase in industrial forestry activity is accounted for through the increase of employment and income, but the potential cost of a decrease in the ability to engage in subsistence harvesting or an increase in subsistence production costs that arise from land use conflicts, are not. Policy shocks that limit a community's ability to engage in subsistence harvesting consequently create a more specialized local economy, by narrowing the economic options within the economic base.

At the extreme, forest policy may cause a permanent state of change that does not allow for multiple uses of either subsistence or the forestry sector by allocating land for protection. If a portion of the land base is withdrawn from both forest industry and subsistence uses for the purpose of protection, both the industrial forestry and subsistence sectors are directly affected by the loss of land, and perhaps indirectly, through the resulting increase of intensity of use on the land base remaining. Economic base analysis captures the impact of the loss of employment and income (from a withdrawal of forest land) to the forestry sector, but again does not capture the impact of loss of in-kind income in the subsistence sector.

The difference between market and the policy shocks as discussed here is that market shocks do not directly change the size of land base available for use in

subsistence, or forest industry production. Thus, the ability to participate in the subsistence sector may not be greatly affected, and the community is better able to absorb market shocks affecting forestry (and other wage) employment. However, policy shocks that decrease access or availability of the land base for subsistence use, decrease the economic diversity within a community.

Changes in transfer payments also have inter-sectoral effects. Although there is no competition between the transfer payment sector and the forestry employment or subsistence sectors for human and land resources, transfer payments contribute a portion of the financial resources required to support subsistence production costs (Condon *et. al.* 1991, Berkes *et. al.* 1991). A combination of seasonal employment and transfer benefits (specifically unemployment insurance) provides a balance of income, and time not engaged in wage labour, identified by harvesters as complimentary to subsistence production (Berkes *et. al.* 1994).

Policy changes that affect a seasonal employee's/harvester's eligibility for unemployment insurance benefits also affect the flow of cash income that may facilitate participation in subsistence production. Changes to policy that decrease the inflow of income associated with unemployment insurance benefits may therefore have a secondary impact on a community's economy of a decreased level of in-kind income.

In communities where industrial forestry, transfer payments, and subsistence harvesting provide sources of income, policies that negatively affect these sectors by

permanently narrowing alternative income opportunities should be evaluated using a framework that can estimate the inter-sectoral effects.

Chapter 5.0. Conclusions and Recommendations for Further Research

This study builds on previous measures of forest industry dependence in two ways. First, the calculation of forest industry dependent communities is extended geographically by including all census subdivisions in the forested region of the prairie provinces, including Indian reserves and rural districts. Second, by including a transfer payment sector in the calculation of dependence a more comprehensive account of the inflows of cash income to the local economy is provided. Historically, studies that measure *forest* dependence have focused solely on wage employment activity. This thesis suggests that a wider interpretation of *forest* dependence should include non-timber forest activities, specifically subsistence harvesting activity. This study provides a theoretical analysis of the utility of incorporating non-timber forest activity (subsistence harvesting) into the economic base dependence measure.

Where communities are heavily dependent on single resource sector(s) such as forestry, shocks attributed to changes in the market and/or policy can have significant welfare effects. The FDI provides a measure for identifying communities dependent on wage employment activity. Calculating the FDI with the inclusion of Indian reserves and rural districts results in a doubling of the number of forest industry dependent communities than previous calculations that exclude these groups.

Including the transfer payment sector to the measure of dependence is an improvement in identifying external sources of income characteristic of all community

economies. Previous studies that exclude the transfer payment sector from the economy, overlook its role in diversifying often limited, single sector dependent communities. If sources of income to all CSD's are expanded to include external sources of transfer payments, the result is a decrease in the total number of FDC's (in all categories of dependence) by 18.9 percent, and a decrease in the total population by 15.7 percent. However, even with the inclusion of the transfer payment sector, there is still a greater number of FDC's and overall population (about 62.3 and 50.6 percent more respectively) than when the FDI is calculated excluding Indian reserves and rural districts, and transfer payments.

To further improve the dependence index, income should be used as the unit of measurement. Due to data limitations, and for the purpose of comparison to Fletcher's study, employment is used here. However, income measures would more accurately reflect the variability in benefits received from different types of employment opportunities and different types of transfer payments. These differences in benefits may significantly alter calculations of dependence, and would serve better in identifying the nature of dependence on the transfer payment sector. Furthermore, if subsistence activity is to be compared to cash income, using in-kind income would eliminate the assumptions necessary to derive equivalent employment measures.

The FDI does not provide an accurate measure of forest dependence in communities where people participate in the subsistence economy. Although it is intriguing to include the subsistence economy in measures of dependence, such

activities seemingly operate neither entirely as basic nor non-basic activity. To include subsistence in the economic base measure of dependence requires restricting subsistence activities to the basic sector. The FDI when calculated to include the subsistence sector indicates that for Waterhen, SK., 38.7 percent of economic base is attributed to 'basic' subsistence activity. Furthermore, with subsistence included, Waterhen, SK. does not register as timber dependent (at FDI equal 0.0648). Despite the problems associated with the FDI measure including subsistence, this analysis demonstrates how the inclusion of subsistence activity provides a more accurate picture of the total economy. Such communities possess a degree of economic diversity that is not captured in traditional applications of economic base models.

This analysis shows that dependence on the forest is wider than typically captured by forest industry dependence measures. Where the forest supports two different sectors (industrial forestry and subsistence harvesting), it is likely that changes in access to the forest resource brought on by activity in one sector will affect the ability to take part in the other sector. An account of inter-sectoral relationships (apart from the direct basic/non-basic relationship stated by economic base theory), is beyond the capability of the FDI measure. The net effects from any given shock in the forest industry or transfer payment sector is not made known from this analysis. Thus, where the subsistence economy is practiced, the FDI does not provide a ranking of communities vulnerable to impacts from market and policy shocks.

The analysis of how economic base dependence measures fail to account for the relationship between the subsistence and the cash economy highlights some of the specific factors that need to be addressed by further research. Although the motivation and the benefits from participation in the two economies may be quite different, economic diversification is recognized to be important to community economic stability. The economic relationship between the two economies is not straightforward. Where the rising cost of living and scarce employment opportunities tend to increase the need to engage in subsistence, the increased cost of subsistence production makes participation in the wage employment necessary. Models must be capable of capturing this interdependence and allow for possible competition between inputs to production. One potential approach is a general equilibrium model. The challenge would be to adapt the model to account for the production process of subsistence, and also for changes in resource availability brought on by industrially, governmentally and naturally produced changes in the forest environment. This latter point has particular consequences where forest uses may be mutually exclusive.

The economic base measure of dependence provides a convenient method for identification of forest industry dependent Aboriginal and non-Aboriginal communities. Where forests and Aboriginal communities coincide, the subsistence economy may be a factor in economic base analysis. If so, more in-depth research is needed to fully understand the effects of changes in forestry products markets and policy on the economic base of communities engaging in subsistence activity.

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Appendix 1. Census Data Issues for the Calculation of the Forest Dependence Index

A drawback to using employment data is that it implicitly assumes that all jobs are the same type (i.e., full time, part time, seasonal, temporary), and that the benefits from each type of job do not vary significantly (i.e., are similarly remunerated in terms of wages and salaries) (Fletcher 1991). Using income as the measurement unit can produce a more accurate estimation of the basic and non-basic sectors. Employment is used to estimate the economic base in this study due to data limitations and to facilitate comparison with Fletcher's calculations.

For studies based in Canada, employment data is easily obtained from the census. However, the way in which the census obtains and estimates employment data may create problems. The census surveys obtain employment information based on the job an individual was working in the last week prior to enumeration, June 4, 1991 (Statistics Canada 1993b). For seasonal employment, if summer (June) does not represent the average number of seasonally employed for the year (i.e., if there is more (or less) seasonal employment in the other three seasons than in the summer) then the employment count is unlikely to represent an average.

The estimates of employment used by Statistics Canada also cause problems for measures of dependence. Census tabulations of employment are subject to random rounding to ensure confidentiality of respondents. In small communities, employment numbers can be rounded upwards or downwards from zero to ten. In small

communities, small absolute changes in employment induce large changes in the calculation of the FDI. Thus random rounding can have a significant effect on the level of dependence in small communities.

Appendix 2: Aggregation of Standard Industrial Classification Codes (1980) into Sectors (Statistics Canada 1993a)

	Division	Major Group	Industry
Agriculture	A	01	Agriculture
		02	Services incidental to Ag.
	E	10 (10:1,3-9)	Food
Mining	D	06 (06:1,2)	Mining
		08	Quarry and Sand Pit
		09 (09:2)	Services incidental to Mining
Forestry	C	04	Logging
		05	Forestry Services
	E	25	Wood
		27	Paper and Allied Products
Energy	D	06 (06:3)	Coal Mines
		07	Crude Petroleum, & Natural Gas
	E	36	Refined Petrol. & Coal Products
Fishing & Trapping	B	03	Fishing and Trapping
	E	10 (10:2)	Fish Products
Hydro	-	41 (41:2)	Construction: Highway & Heavy
		49 (49:1)	Utilities: Electric Power Systems
Manufacturing	E	11, 12, 15 - 19	Beverage; Tobacco; Rubber; Plastic Leather & Allied Products; Primary Textiles; and Textile Products
		24, 26, 28 - 33	Clothing; Furniture & Fixture: Printing; Publishing & Allied: Primary Metals; Fabricated Metal Products: Machinery; Transport Equipment; Electrical and Electronics Products
		35, 37 - 39	Non-metallic Mineral Products; Chemical & Products; and Other Manufacturing
Construction	F	40	Building, Developing & General Contracting
		41	Industrial & Heavy Construction
		42	Trade Contracting
Transportation & Storage	G	45	Transportation
		46	Pipeline Transport
		47	Storage & Warehousing
Communication & Other Utilities	H	48	Communication
		49	Other Utility Industries

Wholesale Trade	I	50 - 57, 59	Farm Products: Petroleum Products; Food, Beverage, Drug, & Tobacco; Apparel & Dry Goods; Household Goods; Motor Vehicle Parts & Accessories, Sales & Service; General Retail Merchandising; and Other Retail Store Industries
Finance & Insurance and Real Estate	K, L	70 - 74, 75, 76	Deposit Accepting Intermediary; Consumer and Business Financing Intermediary; Investment Intermediary: Insurance; and Other Financial Intermediary/Real Estate Operator, Insurance & Real Estate Agent.
Business Services	M	77 (77: 1-7,9)	Business Service Industries
Government Service	N	81 - 84	Federal Government Service; International & Other Extra-territorial Government Service
Educational Service	O	85	Educational Service Industries
Health & Social Service	P	86	Health and Social Service Industries
Accommodation, Food, & Beverage Service	Q	91 92	Accommodation Service Industries Food & Beverage Service Industries
Other Service	R	96 - 99	Other Service Industries.

Appendix 3. Table 3.1: Forest Industry Dependence of Prairie Province Communities, Excluding Indian Reserves, Rural Districts, and Populations of 250 Persons or Less, 1991.

Community	Pop.	Prov.	Geos:*	Total Emp.	Ttl. Base Emp.	Ratio of Sector Base Employment of Total Base Employment: FDI	Ag DI*	En DI*	Mng DI*	F&T DI*	Hyd. DI*
Heavy Forest Industry Dependence:											
- Hudson Bay	1,868	SK	47140040	765	372.4	0.5867	0.0000	0.0000	0.0000	0.0000	0.0000
- The Pas	6,166	MN	46210450	2,925	904.9	0.5488	0.0000	0.0000	0.0086	0.0000	0.0137
- Mayerthorpe	1,692	AB	48130020	645	274.2	0.5412	0.0000	0.0000	0.0000	0.0000	0.0529
- Powerview	736	MN	46010750	300	155.7	0.5084	0.0000	0.0000	0.0000	0.0000	0.0000
total heavy FD population	10,462										
Moderate Forest Industry Dependence:											
Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Hinton	9,046	AB	48140190	4,515	2013.6	0.4638	0.0000	0.3222	0.0096	0.0000	0.0132
- Whitecourt	6,938	AB	48130300	3,540	1655.0	0.4479	0.0000	0.3228	0.0058	0.0000	0.0090
- Green Lake	513	SK	47180210	85	56.5	0.4397	0.0000	0.0000	0.0000	0.0000	0.0000
- Cowley	277	AB	48030160	140	64.5	0.3823	0.0000	0.0872	0.0000	0.0000	0.0000
- Big River	809	SK	47160720	295	205.6	0.3133	0.0000	0.0000	0.0000	0.0000	0.0000
- High Level	2,849	AB	48170930	1,440	585.0	0.3101	0.0000	0.0769	0.0000	0.0000	0.0047
- Sangudo	405	AB	48130040	145	95.6	0.3099	0.0000	0.1094	0.0000	0.0000	0.0000
- Vilna	314	AB	48120240	90	72.1	0.2742	0.0000	0.0996	0.0000	0.0000	0.0000
- Slave Lake	5,607	AB	48170290	2,630	995.6	0.2597	0.0000	0.2338	0.0000	0.0000	0.0428
- Candle Lake	365	SK	47150700	120	78.7	0.2511	0.0000	0.0000	0.3799	0.0000	0.0000
- Steinbach	8,213	MN	46020440	3,605	706.1	0.2473	0.0000	0.0104	0.0000	0.0000	0.0000
- Grande Cache	3,842	AB	48180050	1,810	870.8	0.2418	0.0000	0.4173	0.0000	0.0000	0.1201
- Dunnottar	307	MN	46130490	100	40.4	0.2405	0.2334	0.0000	0.0000	0.0000	0.0000
- Kinuso	230	AB	48170280	55	42.7	0.2311	0.0000	0.0000	0.0000	0.0000	0.0000
- Carrot River	1,027	SK	47140690	315	132.6	0.2215	0.0000	0.0000	0.1111	0.0000	0.0543
total moderately FD pop.	40,742										

orest Industry Dependence:

Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Stavely	478	AB	48030240	170	73.1	0.1994	0.2079	0.0000	0.0000	0.0000	0.0000
- Meadow Lake	4,318	SK	47170520	1,715	586.8	0.1987	0.0000	0.0032	0.0231	0.0000	0.0081
- Pelican Narrows	262	SK	47180550	75	51.7	0.1906	0.0000	0.0000	0.0000	0.0000	0.0000
- Peace River	6,717	AB	48190380	3,305	1116.4	0.1897	0.0000	0.0283	0.0086	0.0000	0.0912
- Edson	7,323	AB	48140240	3,460	1393.3	0.1805	0.0000	0.3350	0.0000	0.0071	0.0183
- Prince Albert	34,181	SK	47150660	14,270	5400.2	0.1799	0.0000	0.0000	0.0163	0.0026	0.0071
- Hines Creek	423	AB	48170640	190	109.4	0.1785	0.0000	0.1285	0.0000	0.0000	0.0000
- St. Louis	433	SK	47150590	175	54.2	0.1782	0.1637	0.0000	0.0000	0.0000	0.0000
- Sundre	1,834	AB	48060360	825	335.8	0.1726	0.0000	0.1465	0.0295	0.0000	0.0386
- Grande Prairie	28,271	AB	48190120	14,545	4932.1	0.1580	0.0000	0.1115	0.0108	0.0000	0.0084
- Donnelly	420	AB	48190440	180	98.3	0.1481	0.1997	0.0000	0.0000	0.0000	0.0000
- High Prairie	2,932	AB	48170210	1,095	509.2	0.1420	0.0000	0.0000	0.0194	0.0000	0.0308
- Crowsnest Pass	6,579	AB	48150070	2,745	1110.5	0.1335	0.0000	0.5800	0.0087	0.0000	0.0150
- Claresholm	3,297	AB	48030220	1,270	547.6	0.1312	0.0000	0.0000	0.0000	0.0000	0.0168
- Evansburg	723	AB	48140020	310	150.1	0.1282	0.0000	0.0354	0.1663	0.0000	0.1157
- Wembley	1,347	AB	48190110	605	225.6	0.1264	0.0000	0.2264	0.0000	0.0000	0.0215
- Smoky Lake	1,057	AB	48120290	320	154.7	0.1242	0.0100	0.1292	0.0000	0.0000	0.0470
- Pierceland	475	SK	47170670	165	80.5	0.1201	0.0000	0.1085	0.0000	0.0000	0.0000
- Sandy Bay	770	SK	47180580	135	81.8	0.1190	0.0000	0.0000	0.0000	0.0000	0.1687
- Tache	7,578	MN	46020690	3,535	594.8	0.1174	0.2541	0.0000	0.0000	0.0000	0.0059
- Grimshaw	2,812	AB	48190740	1,250	488.7	0.1164	0.0000	0.0000	0.0000	0.0000	0.0294
- Swan River	3,947	MN	46200480	1,490	329.7	0.1083	0.0000	0.0000	0.0269	0.0000	0.0000
- Sexsmith	1,260	AB	48190140	580	267.5	0.1068	0.0245	0.0000	0.0000	0.0000	0.0000
- Winnipegosis	771	MN	46170730	180	91.9	0.1031	0.0000	0.0000	0.2161	0.1082	0.0000
- Fox Creek	2,260	AB	48180020	1,185	660.2	0.1016	0.0000	0.7012	0.0000	0.0000	0.0000
- Fort MacLeod	3,112	AB	48030190	1,270	528.0	0.0982	0.1170	0.0000	0.0000	0.0000	0.0648
- Air Ronge	782	SK	47180420	450	196.8	0.0971	0.0000	0.0333	0.0489	0.0000	0.0305
- Hague	655	SK	47150340	225	104.8	0.0912	0.0000	0.0000	0.0000	0.0000	0.0763
- St-Pierre-Jolys	907	MN	46020370	390	98.9	0.0898	0.0000	0.0000	0.0000	0.0000	0.0000

Community	Pop.	Prov.	Geos:	Total Emp.	Tll. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Irricana	812	AB	48060220	335	102.2	0.0897	0.0000	0.0000	0.0000	0.0000	0.0000
- Kinistino	701	SK	47150740	250	107.4	0.0885	0.1180	0.0000	0.0000	0.0000	0.0000
- Turner Valley	1,352	AB	48060090	625	157.3	0.0855	0.0000	0.1618	0.0000	0.0000	0.0297
- Nampa	496	AB	48170390	185	113.0	0.0844	0.3923	0.0000	0.0000	0.0000	0.1630
- Cremona	393	AB	48060310	175	113.5	0.0843	0.0000	0.1720	0.0879	0.0000	0.0000
- Manning	1,139	AB	48170780	435	166.0	0.0839	0.1502	0.1289	0.0000	0.0000	0.0000
- Onoway	681	AB	48130140	245	117.4	0.0801	0.0000	0.0000	0.0000	0.0000	0.0674
- Whitemouth	1,714	MN	46010460	840	290.0	0.0779	0.3316	0.0000	0.2564	0.0000	0.0612
- Rainbow Lake	817	AB	48170970	405	244.4	0.0777	0.0000	0.5824	0.0000	0.0000	0.0000
- Cochrane	5,265	AB	48060190	2,515	695.1	0.0774	0.0000	0.1314	0.0139	0.0000	0.0483
- Spirit River	1,016	AB	48190580	420	164.0	0.0759	0.0315	0.1460	0.0000	0.0000	0.0349
- Fairview	3,023	AB	48190680	1,450	482.5	0.0755	0.0236	0.0000	0.0000	0.0000	0.0159
- Clearwater No. 99	10,133	AB	48090020	5,085	1972.4	0.0748	0.5586	0.2388	0.0000	0.0050	0.0009
- Beaverlodge	1,779	AB	48190090	705	248.9	0.0733	0.0577	0.0000	0.0000	0.0000	0.0000
total slightly FD population	155,243										
- Lynn Lake	834	MN	46230470	295	133.2	0.0687	0.0000	0.0000	0.1659	0.0000	0.0000
- Birch Hills	939	SK	47150680	360	136.1	0.0683	0.0000	0.0000	0.0000	0.0000	0.0500
- Elk Point	1,341	AB	48120160	530	286.6	0.0652	0.0000	0.4307	0.0670	0.0000	0.0000
- Tisdale	3,045	SK	47140440	1,220	429.9	0.0642	0.0000	0.0000	0.0000	0.0000	0.0213
- Lac du Bonnet	1,076	MN	46010600	430	138.0	0.0635	0.0000	0.0000	0.2150	0.0000	0.3169
- Œle-à-la-Crosse, NV	1,284	SK	47180670	260	161.9	0.0586	0.0000	0.0000	0.0604	0.0000	0.0000
- Rocky Mountain House	5,461	AB	48090150	2,355	848.7	0.0521	0.0000	0.3983	0.0000	0.0000	0.0058
- Niverville	1,514	MN	46020460	580	161.8	0.0515	0.1771	0.0000	0.0000	0.0000	0.0000
- Ste. Anne	1,477	MN	46020610	580	167.0	0.0499	0.0000	0.0000	0.0572	0.0000	0.0093
- McLennan	1,020	AB	48190420	335	185.5	0.0494	0.0000	0.0000	0.0000	0.0000	0.0385
- Buffalo Narrows	1,060	SK	47180700	425	200.3	0.0457	0.0000	0.0000	0.0000	0.0748	0.0311
- Falher	1,183	AB	48190460	470	196.9	0.0449	0.2941	0.0000	0.0000	0.0507	0.0000
- Roblin	1,838	MN	46160520	635	188.4	0.0434	0.1212	0.0000	0.0000	0.0000	0.0836
- Airdrie	12,456	AB	48060210	6,035	1494.0	0.0402	0.0000	0.1180	0.0000	0.0000	0.0000
- Lac la Biche	2,549	AB	48160320	1,055	436.1	0.0399	0.0000	0.0046	0.0000	0.0000	0.0023

Community	Pop.	Prov.	Geos:	Total Emp.	Tll. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Stonewall	2,997	MN	46140390	1,265	300.2	0.0379	0.0000	0.0000	0.0000	0.0000	0.0219
- La Ronge	2,578	SK	47180410	1,180	480.5	0.0368	0.0000	0.0020	0.0812	0.0000	0.0302
- Lloydminster (Part)	7,241	SK	47170290	3,215	1085.2	0.0356	0.0000	0.3321	0.0067	0.0000	0.0105
- Crossfield	1,739	AB	48060260	745	243.7	0.0335	0.0905	0.2737	0.0000	0.0000	0.0150
- Barrhead	4,160	AB	48130190	1,700	530.1	0.0298	0.0226	0.0000	0.0000	0.0000	0.0000
- Athabasca	1,965	AB	48130480	765	352.2	0.0230	0.0000	0.0000	0.0000	0.0000	0.0951
- Valleyview	1,980	AB	48180180	820	357.7	0.0223	0.0000	0.2638	0.0000	0.0000	0.0084
- St. Paul	4,881	AB	48120180	2,035	735.7	0.0204	0.0000	0.0000	0.0132	0.0271	0.0784
- Thompson	14,977	MN	46220260	7,365	2539.8	0.0192	0.0000	0.0136	0.7282	0.0030	0.0050
- Snow Lake	1,598	MN	46210710	800	458.6	0.0168	0.0000	0.0000	0.9363	0.0000	0.0000
- Didsbury	3,355	AB	48060320	1,395	400.5	0.0164	0.0863	0.2282	0.0000	0.0000	0.0000
- Cardston	3,480	AB	48030040	1,230	490.3	0.0142	0.0000	0.0000	0.0303	0.0000	0.0000
- Nipawin	4,419	SK	47140760	1,760	591.9	0.0110	0.0000	0.0000	0.0000	0.0000	0.1087
- Olds	5,542	AB	48060340	2,550	827.7	0.0105	0.0000	0.3265	0.0000	0.0000	0.0100
- Calgary	710,677	AB	48060160	373,105	101784.8	0.0099	0.0000	0.1696	0.0030	0.0002	0.0000
- Selkirk	9,815	MN	46130470	4,110	832.3	0.0098	0.0000	0.0000	0.0743	0.0105	0.0963
- Westlock	4,719	AB	48130310	1,820	596.5	0.0092	0.0169	0.0000	0.0164	0.0000	0.0243
- Bonnyville	5,132	AB	48120090	2,100	698.5	0.0069	0.0000	0.2424	0.0211	0.0000	0.0388
- High River	6,269	AB	48060060	2,800	690.3	0.0045	0.2152	0.0000	0.0000	0.0000	0.0162
- Yorkton	15,315	SK	47090120	6,450	2115.6	0.0034	0.0000	0.0000	0.0000	0.0000	0.0060
- Fort McMurray	34,706	AB	48160480	18,130	7574.3	0.0027	0.0000	0.8533	0.0000	0.0000	0.0000
- Canmore	5,681	AB	48150230	2,990	1018.0	0.0026	0.0000	0.0000	0.0586	0.0000	0.0241

*Definitions:

Geos.: Standard geographic code: i.e. 47140040, the first two digits refer to the provincial code (47) is Saskatchewan, the next two digits (14) refer to the census subdivision, the last three digits (004) refer to the census subdivision.

For industrial categories within each of the following sectors refer to Appendix 2.

Ag DI: dependence index calculated for the Agriculture sector

En DI: dependence index calculated for the Energy sector

Mng DI: dependence index calculated for the Mining sector

F& T DI: dependence index calculated for the Fishing and Trapping sector

Hyd DI: dependence index calculated for the Hydro-electric sector.

Appendix 3. Table 3.2: Forest Industry Dependence of Prairie Province Communities, Including Indian Reserves and Rural Districts, and Excluding Populations of 250 Persons or Less, 1991.

Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	Ratio of Sector Base Employment of Total Base Employment: FDI	Ag DI*	En DI*	Mng DI*	F&T DI*	Hyd. DI*
Heavy Forest Industry Dependence:											
- Hudson Bay	1,868	SK	47140040	765	372.4	0.5867	0.0000	0.0000	0.0000	0.0000	0.0000
- Alexander	2,399	MN	46010710	910	288.2	0.5807	0.0000	0.0000	0.0496	0.0337	0.1795
- Big River No. 555	848	SK	47160750	365	147.5	0.5715	0.2068	0.0000	0.0000	0.0000	0.0458
- Hudson Bay No. 394	1,889	SK	47140010	800	322.8	0.5682	0.2805	0.0000	0.0289	0.0000	0.0089
- The Pas	6,166	MN	46210450	2,925	904.9	0.5488	0.0000	0.0000	0.0086	0.0000	0.0137
- Mayerthorpe	1,692	AB	48130020	645	274.2	0.5412	0.0000	0.0000	0.0000	0.0000	0.0529
- Consol (Carrot Valley)	1,892	MN	46210410	840	200.3	0.5371	0.0058	0.0000	0.0467	0.0000	0.0000
- Powerview	736	MN	46010750	300	155.7	0.5084	0.0000	0.0000	0.0000	0.0000	0.0000
- Piney	1,559	MN	46010390	510	225.6	0.5032	0.2707	0.0000	0.0000	0.0000	0.0335
total heavy FD population	19,049										
Moderate Forest Industry Dependence:											
- Hinton	9,046	AB	48140190	4,515	2013.6	0.4638	0.0000	0.3222	0.0096	0.0000	0.0132
- Whitecourt	6,938	AB	48130300	3,540	1655.0	0.4479	0.0000	0.3228	0.0058	0.0000	0.0090
- Green Lake	513	SK	47160210	85	56.5	0.4397	0.0000	0.0000	0.0000	0.0000	0.0000
- Division No. 1, Uno	1,447	MN	46010940	620	320.2	0.4316	0.0000	0.0000	0.0000	0.0000	0.0967
- Cowley	277	AB	48030160	140	64.5	0.3823	0.0000	0.0872	0.0000	0.0000	0.0000
- Big River	809	SK	47160720	295	205.6	0.3133	0.0000	0.0000	0.0000	0.0000	0.0000
- High Level	2,849	AB	48170930	1,440	585.0	0.3101	0.0000	0.0769	0.0000	0.0000	0.0047
- Sangudo	405	AB	48130040	145	95.6	0.3099	0.0000	0.1094	0.0000	0.0000	0.0000
- I. D. No. 15	3,065	AB	48130290	1,585	745.8	0.3098	0.3200	0.1883	0.0265	0.0000	0.0422
- Buckland No. 491	3,556	SK	47150940	1,740	432.4	0.3042	0.0000	0.0000	0.0000	0.0000	0.0220
- I. D. No. 24	286	AB	48160510	75	49.4	0.2997	0.0000	0.0000	0.0000	0.0000	0.0000
- Mountain (North)	1,213	MN	46200550	420	183.3	0.2935	0.3305	0.0000	0.0528	0.0611	0.0000
- Reynolds	1,297	MN	46010430	560	200.7	0.2909	0.3277	0.0000	0.0975	0.0000	0.0000

Community	Pop.	Prov.	Geos:	Total Emp.	Tll. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Upper Hay River 212	333	AB	48178490	40	34.1	0.2902	0.0000	0.2564	0.0000	0.0000	0.0000
- I. D. No. 23	7,260	AB	48170950	2,245	1055.2	0.2838	0.4696	0.0000	0.0000	0.0000	0.0000
- Vilna	314	AB	48120240	90	72.1	0.2742	0.0000	0.0996	0.0000	0.0000	0.0000
- Wabasca 166D	404	AB	48178230	60	37.8	0.2609	0.0000	0.0000	0.0000	0.0000	0.0000
- Slave Lake	5,607	AB	48170290	2,630	995.6	0.2597	0.0000	0.2338	0.0000	0.0000	0.0426
- Meadow Lake No. 588	2,445	SK	47170540	1,255	472.0	0.2596	0.7048	0.0000	0.0000	0.0000	0.0061
- Division No. 21, Uno	1,839	MN	46210780	580	303.0	0.2586	0.0000	0.0000	0.3121	0.0984	0.0381
- Drift Pile River 150	345	AB	48178280	60	39.1	0.2523	0.0000	0.0000	0.0000	0.0000	0.0000
- Candle Lake	365	SK	47150700	120	78.7	0.2511	0.0000	0.0000	0.3799	0.0000	0.0000
- The Pas 21A	276	MN	46210330	70	39.1	0.2507	0.0000	0.0000	0.0000	0.0000	0.0000
- Steinbach	8,213	MN	46020440	3,605	706.1	0.2473	0.0000	0.0104	0.0000	0.0000	0.0000
- Grande Cache	3,842	AB	48180050	1,810	870.8	0.2418	0.0000	0.4173	0.0000	0.0000	0.1201
- Dunnottar	307	MN	46130490	100	40.4	0.2405	0.2334	0.0000	0.0000	0.0000	0.0000
- Carrot River	1,027	SK	47140690	315	132.6	0.2215	0.0000	0.0000	0.1111	0.0000	0.0543
- I. D. No. 17	12,299	AB	48170250	4,755	1966.9	0.2203	0.3462	0.0540	0.0048	0.0000	0.0125
- Consol (Wanless)	328	MN	46210530	160	89.0	0.2196	0.0000	0.0000	0.0000	0.0000	0.0000
- Montreal Lake 106	450	SK	47188020	70	45.7	0.2158	0.0000	0.0000	0.0000	0.0000	0.0000
- Prince Albert No. 461	3,340	SK	47150640	1,345	361.9	0.2137	0.4122	0.0000	0.0000	0.0000	0.0000
- Peter Pond Lake 193	423	SK	47188180	55	46.4	0.2132	0.0000	0.0000	0.0000	0.0000	0.0000
total moderate FD pop.	81,118										

orest Industry Dependence:

Community	Pop.	Prov.	Geos:	Total Emp.	Tll. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Stavely	478	AB	48030240	170	73.1	0.1994	0.2079	0.0000	0.0000	0.0000	0.0000
- Meadow Lake	4,316	SK	47170520	1,715	586.8	0.1987	0.0000	0.0032	0.0231	0.0000	0.0061
- Waterhen 130	509	SK	47178060	90	49.6	0.1981	0.0000	0.0000	0.0000	0.0000	0.0000
- Duck Lake No. 463	982	SK	47150610	455	200.7	0.1949	0.4339	0.0000	0.0000	0.0000	0.0546
- I. D. No. 14	8,592	AB	48140030	3,890	1577.7	0.1936	0.3618	0.2176	0.0155	0.0000	0.0297
- Pelican Narrows	262	SK	47180550	75	51.7	0.1906	0.0000	0.0000	0.0000	0.0000	0.0000

Community	Pop.	Prov.	Geos:	Total Emp.	Tll. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Peace River	6,717	AB	48190380	3,305	1116.4	0.1897	0.0000	0.0283	0.0086	0.0000	0.0912
- Paddockwood No. 520	1,053	SK	47150990	480	211.0	0.1851	0.6793	0.0000	0.0455	0.0000	0.0272
- Stuartburn	1,517	MN	46010350	665	236.3	0.1824	0.7392	0.0000	0.0000	0.0000	0.0013
- La Loche 222	455	SK	47188390	70	54.2	0.1820	0.0000	0.0000	0.0000	0.0000	0.0000
- Edson	7,323	AB	48140240	3,460	1393.3	0.1805	0.0000	0.3350	0.0000	0.0071	0.0183
- Prince Albert	34,181	SK	47150660	14,270	5400.2	0.1799	0.0000	0.0000	0.0183	0.0026	0.0071
- Hines Creek	423	AB	48170640	190	109.4	0.1785	0.0000	0.1285	0.0000	0.0000	0.0000
- St. Louis	433	SK	47150590	175	54.2	0.1782	0.1637	0.0000	0.0000	0.0000	0.0000
- Consol(Cranberry Portage)	817	MN	46210570	345	168.0	0.1727	0.0000	0.0000	0.0580	0.0000	0.0594
- Sundre	1,834	AB	48060360	825	335.8	0.1726	0.0000	0.1465	0.0295	0.0000	0.0386
- Garden River No. 490	711	SK	47150790	415	201.5	0.1697	0.6852	0.0000	0.0000	0.0000	0.0313
- Sturgeon Lake 154	628	AB	48188160	130	58.8	0.1645	0.0000	0.1009	0.0000	0.0000	0.1512
- Grande Prairie	28,271	AB	48190120	14,545	4932.1	0.1580	0.0000	0.1115	0.0108	0.0000	0.0084
- Moose Range No. 486	1,408	SK	47140670	660	340.9	0.1575	0.7963	0.0000	0.0000	0.0000	0.0000
- I. D. No. 21	2,903	AB	48170620	1,275	681.2	0.1568	0.7508	0.0075	0.0000	0.0000	0.0000
- Ste. Anne	3,810	MN	46020570	1,635	472.4	0.1488	0.5019	0.0000	0.0609	0.0000	0.0000
- Donnelly	420	AB	48190440	180	98.3	0.1481	0.1997	0.0000	0.0000	0.0000	0.0000
- High Prairie	2,932	AB	48170210	1,095	509.2	0.1420	0.0000	0.0000	0.0194	0.0000	0.0308
- Crowsnest Pass	6,579	AB	48150070	2,745	1110.5	0.1335	0.0000	0.5800	0.0087	0.0000	0.0150
- East St. Paul	5,820	MN	46130320	3,065	539.0	0.1321	0.0000	0.0000	0.0235	0.0000	0.0470
- Smoky Lake CM No. 13	2,689	AB	48120220	1,500	787.0	0.1321	0.8065	0.0000	0.0000	0.0000	0.0000
- Claresholm	3,297	AB	48030220	1,270	547.6	0.1312	0.0000	0.0000	0.0000	0.0000	0.0168
- The Pas 21E	1,213	MN	46210430	295	147.3	0.1300	0.0000	0.0000	0.0000	0.0000	0.0000
- Shellbrook No. 493	1,834	SK	47160460	850	375.6	0.1286	0.7936	0.0000	0.0000	0.0000	0.0065
- Medstead No. 497	699	SK	47160620	325	228.9	0.1283	0.8365	0.0000	0.0000	0.0000	0.0000
- Evansburg	723	AB	48140020	310	150.1	0.1282	0.0000	0.0354	0.1663	0.0000	0.1157
- Hole or Hollow Water 10	427	MN	46190530	95	76.1	0.1278	0.0000	0.0000	0.0000	0.0000	0.0000
- Wembley	1,347	AB	48190110	605	225.6	0.1264	0.0000	0.2264	0.0000	0.0000	0.0215
- Smoky Lake	1,057	AB	48120290	320	154.7	0.1242	0.0100	0.1292	0.0000	0.0000	0.0470

Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- St. Clements	7,870	MN	46130560	4,030	394.6	0.1227	0.0000	0.0000	0.0175	0.0475	0.0286
- Park (North)	395	MN	46160630	130	79.3	0.1214	0.3941	0.0000	0.0000	0.0000	0.0000
- I. D. No. 22	4,259	AB	48170760	1,990	866.5	0.1213	0.7101	0.0147	0.0000	0.0000	0.0324
- Grande Prairie CM No. 1	12,314	AB	48190060	6,160	2231.0	0.1209	0.5804	0.0817	0.0176	0.0000	0.0101
- Torch River No. 488	2,022	SK	47140770	1,020	522.4	0.1206	0.8475	0.0000	0.0175	0.0000	0.0000
- Pierceland	475	SK	47170670	165	80.5	0.1201	0.0000	0.1085	0.0000	0.0000	0.0000
- Cross Lake 19A	996	MN	46220520	125	80.7	0.1194	0.0000	0.0000	0.0000	0.0000	0.1013
- Sandy Bay	770	SK	47180580	135	81.8	0.1190	0.0000	0.0000	0.0000	0.0000	0.1687
- Tache	7,576	MN	46020690	3,535	594.8	0.1174	0.2541	0.0000	0.0000	0.0000	0.0059
- Canoe Lake 165	471	SK	47188170	110	83.7	0.1168	0.0000	0.0000	0.1183	0.0000	0.0000
- Grimshaw	2,812	AB	48190740	1,250	488.7	0.1164	0.0000	0.0000	0.0000	0.0000	0.0294
- Hanover	8,905	MN	46020410	4,280	1319.2	0.1120	0.5779	0.0000	0.0000	0.0000	0.0000
- Swan River	3,947	MN	46200480	1,490	329.7	0.1083	0.0000	0.0000	0.0269	0.0000	0.0000
- Sexsmith	1,260	AB	48190140	580	267.5	0.1068	0.0245	0.0000	0.0000	0.0000	0.0000
- Division No. 18, Uno	835	SK	47180900	345	182.7	0.1057	0.0000	0.0000	0.1626	0.0000	0.0927
- Fort Alexander 3	1,579	MN	46190500	255	138.0	0.1034	0.0000	0.0000	0.0000	0.0000	0.0000
- Winnipegosis	771	MN	46170730	180	91.9	0.1031	0.0000	0.0000	0.2161	0.1082	0.0000
- Shell River	1,165	MN	46160490	565	325.5	0.1025	0.8303	0.0000	0.0000	0.0302	0.0000
- Lac du Bonnet	2,231	MN	46010570	1,145	410.1	0.1017	0.2046	0.0000	0.2904	0.0000	0.1300
- Fox Creek	2,260	AB	48180020	1,185	660.2	0.1016	0.0000	0.7012	0.0000	0.0000	0.0000
- Fort MacLeod	3,112	AB	48030190	1,270	528.0	0.0982	0.1170	0.0000	0.0000	0.0000	0.0648
- Air Ronge	782	SK	47180420	450	196.8	0.0971	0.0000	0.0333	0.0489	0.0000	0.0305
- Division No. 22, Uno	2,105	MN	46220460	590	302.9	0.0934	0.0000	0.0000	0.0315	0.1314	0.0542
- Hague	655	SK	47150340	225	104.8	0.0912	0.0000	0.0000	0.0000	0.0000	0.0783
- I. D. No. 18 (Part)	11,388	AB	48160300	4,385	1706.5	0.0903	0.2914	0.1628	0.0000	0.0233	0.0162
- St-Pierre-Jolys	907	MN	46020370	390	98.9	0.0898	0.0000	0.0000	0.0000	0.0000	0.0000
- Irricana	812	AB	48060220	335	102.2	0.0897	0.0000	0.0000	0.0000	0.0000	0.0000
- Nelson House 170	1,272	MN	46220590	265	159.9	0.0891	0.0000	0.0000	0.0000	0.0933	0.0000
- I. D. No. 16	5,269	AB	48160150	2,630	1279.9	0.0887	0.6551	0.1076	0.0193	0.0000	0.0059

Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Kinistino	701	SK	47150740	250	107.4	0.0885	0.1180	0.0000	0.0000	0.0000	0.0000
- Canwood No. 494	1,811	SK	47160510	895	495.2	0.0873	0.8306	0.0000	0.0000	0.0000	0.0000
- Swan River	3,917	MN	46200410	1,470	643.5	0.0867	0.8695	0.0000	0.0138	0.0000	0.0000
- Turner Valley	1,352	AB	48060090	625	157.3	0.0855	0.0000	0.1618	0.0000	0.0000	0.0297
- Nampa	496	AB	48170390	185	113.0	0.0844	0.3923	0.0000	0.0000	0.0000	0.1630
- Cremona	393	AB	48060310	175	113.5	0.0843	0.0000	0.1720	0.0879	0.0000	0.0000
- Manning	1,139	AB	48170780	435	166.0	0.0839	0.1502	0.1289	0.0000	0.0000	0.0000
- I. D. No. 5	423	AB	48150130	350	230.9	0.0829	0.0000	0.0000	0.0000	0.0000	0.0000
- Onoway	681	AB	48130140	245	117.4	0.0801	0.0000	0.0000	0.0000	0.0000	0.0674
- Lac Ste. Anne CM No. 28	8,059	AB	48130010	4,035	1576.0	0.0793	0.6836	0.0690	0.0124	0.0000	0.0321
- Whitemouth	1,714	MN	46010460	840	290.0	0.0779	0.3316	0.0000	0.2564	0.0000	0.0612
- Rainbow Lake	817	AB	48170970	405	244.4	0.0777	0.0000	0.5824	0.0000	0.0000	0.0000
- Cochrane	5,265	AB	48060190	2,515	695.1	0.0774	0.0000	0.1314	0.0139	0.0000	0.0483
- Spirit River	1,016	AB	48190580	420	184.0	0.0759	0.0315	0.1460	0.0000	0.0000	0.0349
- Fairview	3,023	AB	48190680	1,450	482.5	0.0755	0.0236	0.0000	0.0000	0.0000	0.0159
- Clearwater No. 99	10,133	AB	48090020	5,085	1972.4	0.0748	0.5586	0.2388	0.0000	0.0050	0.0009
- Beaverlodge	1,779	AB	48190090	705	248.9	0.0733	0.0577	0.0000	0.0000	0.0000	0.0000
total slightly FD population	268,596										
Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Loon Lake No. 561	930	SK	47170560	465	271.4	0.0703	0.7022	0.0790	0.0000	0.0000	0.0000
- Minitonas	1,227	MN	46200370	670	335.8	0.0687	0.8908	0.0000	0.0000	0.0000	0.0000
- Lynn Lake	834	MN	46230470	295	133.2	0.0687	0.0000	0.0000	0.1859	0.0000	0.0000
- Birch Hills	939	SK	47150680	360	136.1	0.0683	0.0000	0.0000	0.0000	0.0000	0.0500
- Division No. 19, Uno	3,717	MN	46190450	830	417.0	0.0662	0.1012	0.0000	0.0000	0.3471	0.0000
- Elk Point	1,341	AB	48120160	530	286.6	0.0652	0.0000	0.4307	0.0870	0.0000	0.0000
- Tisdale	3,045	SK	47140440	1,220	429.9	0.0642	0.0000	0.0000	0.0000	0.0000	0.0213
- Lac du Bonnet	1,076	MN	46010600	430	138.0	0.0635	0.0000	0.0000	0.2150	0.0000	0.3169
- Hazel Dell No. 335	903	SK	47090600	430	226.8	0.0624	0.6429	0.0000	0.0000	0.0000	0.2257

Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Œle-à-la-Crosse, NV	1,284	SK	47180670	260	161.9	0.0586	0.0000	0.0000	0.0604	0.0000	0.0000
- La Broquerie	2,038	MN	46020530	895	302.5	0.0576	0.6623	0.0000	0.0308	0.0321	0.0000
- Mountain (South)	830	MN	46200320	345	166.5	0.0541	0.8918	0.0000	0.0000	0.0000	0.0299
- Rocky Mountain House	5,461	AB	48090150	2,355	848.7	0.0521	0.0000	0.3983	0.0000	0.0000	0.0058
- Peace No. 135	1,481	AB	48190710	745	349.5	0.0520	0.6640	0.0000	0.0000	0.0000	0.0000
- Niverville	1,514	MN	46020460	580	161.8	0.0515	0.1771	0.0000	0.0000	0.0000	0.0000
- Ste. Anne	1,477	MN	46020610	580	167.0	0.0499	0.0000	0.0000	0.0572	0.0000	0.0093
- McLennan	1,020	AB	48190420	335	185.5	0.0494	0.0000	0.0000	0.0000	0.0000	0.0385
- I. D. No. 20	2,722	AB	48190590	1,410	841.6	0.0493	0.7233	0.0843	0.0000	0.0000	0.0392
- Rockwood	6,990	MN	46140360	3,450	732.1	0.0479	0.6080	0.0000	0.0374	0.0000	0.0269
- Buffalo Narrows	1,060	SK	47180700	425	200.3	0.0457	0.0000	0.0000	0.0000	0.0748	0.0311
- Falher	1,183	AB	48190460	470	196.9	0.0449	0.2941	0.0000	0.0000	0.0507	0.0000
- Parkdale No. 498	788	SK	47170470	310	213.7	0.0439	0.9301	0.0000	0.0000	0.0000	0.0000
- Riblin	1,836	MN	46160520	635	168.4	0.0434	0.1212	0.0000	0.0000	0.0000	0.0636
- Invermay No. 305	611	SK	47090540	315	225.6	0.0416	0.8552	0.0000	0.0000	0.0000	0.0000
- Fairview No. 136	1,812	AB	48190660	895	438.0	0.0406	0.7727	0.0000	0.0000	0.0000	0.0169
- Airdrie	12,456	AB	48060210	6,035	1494.0	0.0402	0.0000	0.1180	0.0000	0.0000	0.0000
- Hoodoo No. 401	699	SK	47150390	420	228.2	0.0402	0.9522	0.0000	0.0000	0.0000	0.0000
- Lac la Biche	2,546	AB	48160320	1,055	436.1	0.0399	0.0000	0.0046	0.0000	0.0000	0.0023
- Stonewall	2,997	MN	46140390	1,265	300.2	0.0379	0.0000	0.0000	0.0000	0.0000	0.0219
- West St. Paul	3,658	MN	46130370	1,830	392.2	0.0376	0.0000	0.0000	0.0000	0.0000	0.0213
- La Ronge	2,578	SK	47180410	1,180	480.5	0.0368	0.0000	0.0020	0.0812	0.0000	0.0302
- Mountain View CM No. 17	9,951	AB	48060280	5,380	2500.2	0.0367	0.8399	0.0627	0.0057	0.0000	0.0037
- Lloydminster (Part)	7,241	SK	47170290	3,215	1085.2	0.0356	0.0000	0.3321	0.0067	0.0000	0.0105
- Tisdale No. 427	1,163	SK	47140430	595	282.9	0.0336	0.7841	0.0000	0.0000	0.0000	0.0059
- Crossfield	1,739	AB	48060260	745	243.7	0.0335	0.0905	0.2737	0.0000	0.0000	0.0150
- Norway House 17	2,818	MN	46220580	550	252.8	0.0333	0.0000	0.0000	0.0000	0.1180	0.0474
- Barrhead County No. 11	5,591	AB	48130180	2,760	1328.2	0.0325	0.9305	0.0000	0.0000	0.0000	0.0067
- Pincher Creek No. 9	3,108	AB	48030110	1,740	827.3	0.0311	0.9002	0.0000	0.0000	0.0000	0.0002

Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	FDI	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Bjorkdale No. 426	1,253	SK	47140380	635	285.2	0.0307	0.8946	0.0000	0.0332	0.0000	0.0000
- Barrhead	4,160	AB	48130190	1,700	530.1	0.0298	0.0226	0.0000	0.0000	0.0000	0.0000
- Laird No. 404	1,102	SK	47150260	615	312.7	0.0281	0.9536	0.0000	0.0000	0.0000	0.0000
- Fisher	2,145	MN	46180680	1,045	446.3	0.0269	0.9400	0.0000	0.0000	0.0000	0.0000
- Rocky View No. 44	19,868	AB	48060140	10,865	2988.3	0.0262	0.4797	0.1724	0.0029	0.0000	0.0000
- Porcupine No. 395	1,321	SK	47140060	845	513.2	0.0260	0.9331	0.0000	0.0181	0.0000	0.0000
- St. Peter No. 369	1,086	SK	47150010	620	343.9	0.0255	0.8212	0.0000	0.0275	0.0000	0.0000
- Orkney No. 244	1,899	SK	47090110	990	315.7	0.0255	0.3712	0.0000	0.0000	0.0000	0.0196
- Willow Creek No. 26	4,764	AB	48030180	2,480	1334.9	0.0254	0.9679	0.0000	0.0000	0.0000	0.0000
- Blood 148	4,013	AB	48038020	610	338.4	0.0251	0.0000	0.0000	0.0000	0.0000	0.0000
- Westlock No. 92	6,994	AB	48130280	3,485	1495.4	0.0244	0.8996	0.0000	0.0131	0.0000	0.0037
- Star City No. 428	1,081	SK	47140470	690	370.4	0.0233	0.9503	0.0127	0.0000	0.0000	0.0000
- Athabasca	1,965	AB	48130480	765	352.2	0.0230	0.0000	0.0000	0.0000	0.0000	0.0951
- Valleyview	1,960	AB	48180180	820	357.7	0.0223	0.0000	0.2638	0.0000	0.0000	0.0084
- Alonsa	1,952	MN	46170260	700	359.5	0.0222	0.7120	0.0264	0.0000	0.0272	0.0000
- St. Andrews	9,461	MN	46130430	5,035	701.7	0.0221	0.0000	0.0000	0.0088	0.0191	0.0237
- Preeceville No. 334	1,300	SK	47090620	730	388.1	0.0220	0.9689	0.0000	0.0000	0.0000	0.0090
- St. Paul	4,881	AB	48120180	2,035	735.7	0.0204	0.0000	0.0000	0.0132	0.0271	0.0784
- Thompson	14,977	MN	46220260	7,365	2539.8	0.0192	0.0000	0.0136	0.7282	0.0030	0.0050
- Rosthern No. 403	1,817	SK	47150310	820	435.8	0.0192	0.8205	0.0000	0.0000	0.0000	0.0292
- Athabasca County No. 12	6,049	AB	48130440	3,170	1230.2	0.0180	0.6725	0.0332	0.0078	0.0000	0.0228
- Snow Lake	1,598	MN	46210710	800	458.6	0.0168	0.0000	0.0000	0.9363	0.0000	0.0000
- Didsbury	3,355	AB	48060320	1,395	400.5	0.0164	0.0863	0.2282	0.0000	0.0000	0.0000
- I. D. No. 19	1,378	AB	48190490	760	506.9	0.0160	0.8704	0.0320	0.0000	0.0000	0.0070
- Cardston	3,480	AB	48030040	1,230	490.3	0.0142	0.0000	0.0000	0.0303	0.0000	0.0000
- Dauphin	2,669	MN	46170480	1,350	448.1	0.0137	0.7526	0.0000	0.0312	0.0000	0.0000
- St. Paul County No. 19	6,489	AB	48120140	3,145	1267.2	0.0136	0.7171	0.0092	0.0234	0.0000	0.0183
- Nipawin	4,419	SK	47140760	1,760	591.9	0.0110	0.0000	0.0000	0.0000	0.0000	0.1087
- Olds	5,542	AB	48060340	2,550	827.7	0.0105	0.0000	0.3265	0.0000	0.0000	0.0100

Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	FDI*	Ag DI	En DI	Mng DI	F&T DI	Hyd. DI
- Smoky River No. 130	2,613	AB	48190410	1,235	697.3	0.0100	0.8731	0.0000	0.0000	0.0000	0.0000
- Calgary	710,677	AB	48060160	373,105	101784.8	0.0099	0.0000	0.1696	0.0030	0.0002	0.0000
- Selkirk	9,815	MN	46130470	4,110	832.3	0.0098	0.0000	0.0000	0.0743	0.0105	0.0963
- Westlock	4,719	AB	48130310	1,820	596.5	0.0092	0.0169	0.0000	0.0164	0.0000	0.0243
- Bonnyville	5,132	AB	48120090	2,100	698.5	0.0069	0.0000	0.2424	0.0211	0.0000	0.0388
- Ritchot	5,146	MN	46020750	2,585	417.8	0.0062	0.0996	0.0000	0.0000	0.0000	0.0893
- Bonnyville No. 87	10,269	AB	48120040	5,130	2302.3	0.0054	0.1626	0.0367	0.0000	0.0000	0.0006
- High River	6,269	AB	48060060	2,800	690.3	0.0045	0.2152	0.0000	0.0000	0.0000	0.0162
- Yorkton	15,315	SK	47090120	6,450	2115.6	0.0034	0.0000	0.0000	0.0000	0.0000	0.0060
- Fort McMurray	34,706	AB	48160480	18,130	7574.3	0.0027	0.0000	0.8533	0.0000	0.0000	0.0000
- Canmore	5,681	AB	48150230	2,990	1018.0	0.0026	0.0000	0.0000	0.0586	0.0000	0.0241

*Definitions:

Geos.: Standard geographic code: i.e. 47140040, the first two digits refer to the provincial code (47) is Saskatchewan, the next two digits (14) refer to the census subdivision, the last three digits (004) refer to the census subdivision.

For industrial categories within each of the following sectors refer to Appendix 2.

Ag DI: dependence index calculated for the Agriculture sector

En DI: dependence index calculated for the Energy sector

Mng DI: dependence index calculated for the Mining sector

F& T DI: dependence index calculated for the Fishing and Trapping sector

Hyd DI: dependence index calculated for the Hydro-electric sector.

Appendix 3. Table 3.3: The Forest Industry Dependence Index with Transfer Payment Sector for All Communities, Excluding Populations of 250 Persons or Less, 1991.

Community	Pop.	Prov.	Geos:	Total Emp.	Ttl. Base Emp.	Ratio of Sector Base Employment of Total Base Employment: FDI	TPDI*	Ag DI*	En DI*	Mn DI*	F&T DI*	Hyd. DI*
Heavy Forest Industry Dependence:												
- Hudson Bay	1,321	SK	47140040	925	391.2	0.5588	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
- Big River No. 555	848	SK	47160750	440	156.6	0.5385	0.0000	0.2207	0.0000	0.0000	0.0000	0.0447
- The Pas	6,166	MN	46210450	3,895	962.9	0.5161	0.0000	0.0000	0.0000	0.0082	0.0000	0.0147
total heavily FD population	8,335											
Moderate Forest Industry Dependence:												
- Powerview	736	MN	46010750	380	165.8	0.4779	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
- Hudson Bay No. 394	1,868	SK	47140010	1,165	384.9	0.4760	0.2454	0.1986	0.0000	0.0240	0.0000	0.0053
- Hinton	9,046	AB	4814019	5,295	2,057.9	0.4540	0.0000	0.0000	0.3175	0.0094	0.0000	0.0135
- Consol (Carrot Valley)	1,892	MN	46210410	1,065	246.9	0.4367	0.0000	0.0362	0.0000	0.0381	0.0000	0.0000
- Whitecourt	6,938	AB	4813030	3,965	1,730.6	0.4287	0.0000	0.0000	0.3135	0.0055	0.0000	0.0099
- Alexander	2,399	MN	46010710	1,450	406.3	0.4110	0.3288	0.0000	0.0000	0.0349	0.0238	0.1225
- Mayerthorpe	1,692	AB	4813002	925	373.5	0.3965	0.3178	0.0000	0.0000	0.0000	0.0000	0.0361
- Division No. 1, Uno	1,447	MN	46010940	1,010	397.7	0.3468	0.2689	0.0000	0.0000	0.0000	0.0000	0.0739
- I. D. No. 15	3,065	AB	4813029	1,850	754.5	0.3065	0.0000	0.3207	0.1885	0.0262	0.0000	0.0424
- Cowley	277	AB	4803016	200	81.1	0.3032	0.3098	0.0000	0.0596	0.0000	0.0000	0.0000
- Piney	1,559	MN	46010390	1,005	382.7	0.2950	0.5574	0.1006	0.0000	0.0000	0.0000	0.0117
- Buckland No. 491	3,556	SK	47150940	2,150	473.3	0.2783	0.0000	0.0075	0.0000	0.0000	0.0000	0.0218
- High Level	2,849	AB	4817093	1,560	663.0	0.2742	0.0000	0.0000	0.0750	0.0000	0.0000	0.0061
- I. D. No. 23	7,260	AB	4817095	2,795	1,105.6	0.2707	0.0567	0.4450	0.0000	0.0000	0.0000	0.0000
- Big River	809	SK	47160720	475	254.2	0.2528	0.2742	0.0000	0.0000	0.0000	0.0000	0.0000
- Meadow Lake No. 588	2,445	SK	47170540	1,495	509.4	0.2409	0.0000	0.6844	0.0000	0.0000	0.0000	0.0094
- Steinbach	8,213	MN	46020440	5,055	725.1	0.2407	0.0458	0.0000	0.0101	0.0000	0.0000	0.0000
- Slave Lake	5,607	AB	4817029	2,920	1,086.8	0.2384	0.0000	0.0000	0.2205	0.0000	0.0000	0.0409
- Grande Cache	3,842	AB	4818005	2,060	904.3	0.2331	0.0000	0.0000	0.4056	0.0000	0.0000	0.1167

Community	Pop.	Prov.	Geos:	Total Emp	Ttl. Base Emp	FDI	TPDI	Ag DI	En DI	Mn DI	F&T DI	Hyd. DI
- Reynolds	1,297	MN	46010430	915	261.9	0.2219	0.3764	0.2114	0.0000	0.0744	0.0000	0.0000
- Mountain (North)	1,213	MN	46200550	730	254.1	0.2105	0.4149	0.1946	0.0000	0.0378	0.0584	0.0000
- The Pas 21A	276	MN	46210330	115	46.8	0.2087	0.2730	0.0000	0.0000	0.0000	0.0000	0.0000
- Prince Albert No. 461	3,340	SK	47150640	1,720	371.1	0.2085	0.0000	0.4118	0.0000	0.0000	0.0000	0.0000
- I. D. No. 24	286	AB	4816051	125	71.8	0.2054	0.3929	0.0000	0.0000	0.0000	0.0000	0.0000
total moderately FD pop.	71,912											
Slight Forest Industry Dependence:												
Community	Pop.	Prov.	Geos:	Total Emp	Ttl. Base Emp	FDI	TPDI	Ag DI	En DI	Mn DI	F&T DI	Hyd. DI
- Consol (Wanless)	328	MN	46210530	185	99.2	0.1977	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
- Division No. 21, Uno	1,839	MN	46210780	990	397.1	0.1963	0.3337	0.0000	0.0000	0.2378	0.0750	0.0242
- Duck Lake No. 463	982	SK	47150610	570	207.1	0.1890	0.0000	0.4329	0.0000	0.0000	0.0000	0.0536
- Sangudo	405	AB	4813004	275	156.3	0.1884	0.5250	0.0000	0.0505	0.0000	0.0000	0.0000
- Peace River	6,717	AB	4819038	3,920	1,148.1	0.1847	0.0000	0.0000	0.0294	0.0083	0.0000	0.0892
- Green Lake	513	SK	47180210	235	137.8	0.1788	0.6924	0.0000	0.0000	0.0000	0.0000	0.0000
- Edson	7,323	AB	4814024	4,150	1,408.7	0.1786	0.0000	0.0000	0.3321	0.0000	0.0070	0.0183
- Paddockwood No. 520	1,053	SK	47150990	640	219.3	0.1779	0.0519	0.6457	0.0000	0.0437	0.0000	0.0257
- I. D. No. 17	12,299	AB	4817025	6,535	2,428.3	0.1778	0.2638	0.2652	0.0355	0.0038	0.0000	0.0079
- Meadow Lake	4,318	SK	47170520	2,445	677.3	0.1717	0.2396	0.0000	0.0009	0.0198	0.0000	0.0049
- Consol (Cranberry Portage)	817	MN	46210570	495	175.4	0.1652	0.0642	0.0000	0.0000	0.0555	0.0000	0.0559
- I. D. No. 14	8,692	AB	4814003	5,135	1,854.0	0.1643	0.1886	0.2970	0.1793	0.0132	0.0000	0.0237
- Garden River No. 490	711	SK	47150790	505	209.3	0.1636	0.0000	0.6791	0.0000	0.0000	0.0000	0.0313
- Prince Albert	34,181	SK	47150660	20,745	6,223.9	0.1556	0.2664	0.0000	0.0000	0.0139	0.0023	0.0038
- Pelican Narrows	252	SK	47180550	120	63.5	0.1548	0.2699	0.0000	0.0000	0.0000	0.0000	0.0000
- Moose Range No. 486	1,408	SK	47140670	820	347.9	0.1545	0.0000	0.7933	0.0000	0.0000	0.0000	0.0000
- Grande Prairie	28,271	AB	4819012	17,035	5,157.9	0.1513	0.0000	0.0000	0.1096	0.0103	0.0000	0.0088
- I. D. No. 21	2,903	AB	4817062	1,630	740.1	0.1441	0.0956	0.6856	0.0039	0.0000	0.0000	0.0000
- Vilna	314	AB	4812024	195	136.9	0.1432	0.5185	0.0000	0.0363	0.0000	0.0000	0.0000
- Sundre	1,834	AB	4806036	1,145	423.7	0.1361	0.2840	0.0000	0.1072	0.0233	0.0000	0.0282

Community	Pop.	Prov.	Geos:	Total Emp	Til. Base Emp	FDI	TPDI	Ag DI	En DI	Mn DI	F&T DI	Hyd. DI
- Stuartburn	1,517	MN	46010350	1,075	318.6	0.1343	0.3412	0.5122	0.0000	0.0000	0.0000	0.0000
- Ste. Anne	3,810	MN	46020570	2,005	532.7	0.1330	0.0000	0.4832	0.0000	0.0542	0.0000	0.0000
- Donnelly	421	AB	4819044	245	111.8	0.1297	0.1993	0.1640	0.0000	0.0000	0.0000	0.0000
- Shellbrook No. 493	1,834	SK	47160460	1,105	375.9	0.1285	0.0000	0.7935	0.0000	0.0000	0.0000	0.0065
- Medstead No. 497	699	SK	47160620	385	235.8	0.1248	0.0000	0.8307	0.0000	0.0000	0.0000	0.0000
- Wembley	1,347	AB	4819011	720	229.0	0.1246	0.0000	0.0000	0.2245	0.0000	0.0000	0.0216
- Hines Creek	423	AB	4817084	310	158.3	0.1223	0.4165	0.0000	0.0758	0.0000	0.0000	0.0000
- Drift Pile River 150	345	AB	4817828	130	80.7	0.1207	0.5867	0.0000	0.0000	0.0000	0.0000	0.0000
- Smoky Lake CM No. 13	2,689	AB	4812022	1,930	846.2	0.1194	0.1105	0.7248	0.0000	0.0000	0.0000	0.0000
- Torch River No. 488	2,022	SK	47140770	1,290	528.7	0.1192	0.0000	0.8458	0.0000	0.0173	0.0000	0.0000
- Carrot River	1,027	SK	47140690	605	244.4	0.1190	0.6118	0.0000	0.0000	0.0598	0.0000	0.0240
- St. Louis	433	SK	47150590	285	80.6	0.1187	0.5435	0.0289	0.0000	0.0000	0.0000	0.0000
- Stavely	478	AB	4803024	295	121.5	0.1185	0.6053	0.0902	0.0000	0.0000	0.0000	0.0000
- Grande Prairie CM No. 1	12,314	AB	4819006	7,535	2,276.6	0.1184	0.0269	0.5672	0.0793	0.0172	0.0000	0.0097
- High Prairie	2,932	AB	4817021	1,535	623.9	0.1152	0.2762	0.0000	0.0000	0.0158	0.0000	0.0228
- I. D. No. 22	4,259	AB	4817076	2,510	928.6	0.1129	0.0887	0.6575	0.0110	0.0000	0.0000	0.0295
- Grimshaw	2,812	AB	4819074	1,590	522.8	0.1086	0.4200	0.0000	0.0000	0.0000	0.0000	0.0264
- Sexsmith	1,260	AB	4819014	720	276.7	0.1031	0.0523	0.0207	0.0000	0.0000	0.0000	0.0000
- Shell River	1,165	MN	46160490	780	326.1	0.1024	0.0000	0.8298	0.0000	0.0000	0.0301	0.0000
- Evansburg	723	AB	4814002	450	188.4	0.1013	0.3266	0.0000	0.0179	0.1324	0.0000	0.0894
- Lac du Bonnet	2,231	MN	46010570	1,575	413.1	0.1010	0.0000	0.2060	0.0000	0.2884	0.0000	0.1295
- Park (North)	395	MN	46160630	215	95.7	0.0998	0.2585	0.2992	0.0000	0.0000	0.0000	0.0000
- Fox Creek	2,260	AB	4818002	1,305	679.2	0.0991	0.0000	0.0000	0.6865	0.0000	0.0000	0.0000
- Hanover	8,905	MN	46020410	5,290	1,510.9	0.0987	0.0000	0.5377	0.0000	0.0000	0.0000	0.0000
- East St. Paul	5,820	MN	46130320	3,730	763.5	0.0947	0.0000	0.0000	0.0000	0.0170	0.0000	0.0404
- Montreal Lake 106	450	SK	47188020	185	103.0	0.0943	0.6993	0.0000	0.0000	0.0000	0.0000	0.0000
- Crowsnest Pass	6,579	AB	4815007	4,150	1,577.9	0.0929	0.4318	0.0000	0.3947	0.0061	0.0000	0.0069
- Pierceland	475	SK	47170670	265	104.5	0.0918	0.3679	0.0000	0.0807	0.0000	0.0000	0.0000
- Upper Hay River 212	333	AB	4817849	150	105.7	0.0918	0.7936	0.0000	0.0580	0.0000	0.0000	0.0000

Community	Pop.	Prov.	Geos:	Total Emp	Ttl. Base Emp	FDI	TPDI	Ag DI	En DI	Mn DI	F&T DI	Hyd. DI
- St. Clements	7,870	MN	46130560	5,235	542.7	0.0906	0.0000	0.0305	0.0000	0.0131	0.0347	0.0278
- Tache	7,576	MN	46020690	4,260	805.8	0.0883	0.0000	0.2491	0.0000	0.0000	0.0000	0.0128
- Air Ronge	782	SK	47180420	505	221.4	0.0869	0.0000	0.0000	0.0317	0.0437	0.0000	0.0296
- I. D. No. 16	5,269	AB	4818015	3,250	1,320.6	0.0858	0.0404	0.6325	0.1030	0.0187	0.0000	0.0054
- Cremona	393	AB	4806031	210	113.9	0.0840	0.0000	0.0000	0.1719	0.0676	0.0000	0.0000
- Claresholm	3,297	AB	4803022	2,095	843.2	0.0839	0.5452	0.0000	0.0000	0.0000	0.0000	0.0063
- St-Pierre-Jolys	907	MN	46020370	555	105.6	0.0839	0.0895	0.0000	0.0000	0.0000	0.0000	0.0000
- Swan River	2,947	MN	46200410	1,895	668.9	0.0838	0.0000	0.8533	0.0000	0.0134	0.0000	0.0000
- Wabasca 166D	404	AB	4817823	185	115.6	0.0832	0.8021	0.0000	0.0000	0.0000	0.0000	0.0000
- Waterhen 130	509	SK	47178060	235	116.2	0.0830	0.7785	0.0000	0.0000	0.0000	0.0000	0.0000
- Division No. 22, Uno	2,105	MN	46220460	900	341.9	0.0823	0.1689	0.0000	0.0000	0.0278	0.1164	0.0455
- Dunnottar	307	MN	46130490	275	115.3	0.0818	0.8491	0.0000	0.0000	0.0000	0.0000	0.0000
- I. D. No. 5	423	AB	4815013	370	239.0	0.0805	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
- La Loche 222	455	SK	47188390	200	121.0	0.0801	0.6906	0.0000	0.0000	0.0000	0.0000	0.0000
- Irricana	812	AB	4806022	430	115.4	0.0790	0.1735	0.0000	0.0000	0.0000	0.0000	0.0000
- Canwood No. 494	1,811	SK	47160510	1,245	545.6	0.0790	0.1116	0.7373	0.0000	0.0000	0.0000	0.0000
- Whitemouth	1,714	MN	46010460	1,180	295.2	0.0764	0.0314	0.3225	0.0000	0.2519	0.0000	0.0597
- Hole or Hollow Water 10	427	MN	46190530	215	125.3	0.0763	0.4768	0.0000	0.0000	0.0000	0.0000	0.0000
- Cochrane	5,265	AB	4806019	3,010	710.6	0.0758	0.0000	0.0000	0.1299	0.0136	0.0000	0.0476
- Nampa	496	AB	4817039	245	125.4	0.0758	0.1379	0.3457	0.0000	0.0000	0.0000	0.1458
- Fort MacLeod	3,112	AB	4803019	1,895	681.7	0.0750	0.4321	0.0657	0.0000	0.0000	0.0000	0.0465
- Rainbow Lake	817	AB	4817097	435	255.2	0.0749	0.0000	0.0000	0.5633	0.0000	0.0000	0.0000
- Sandy Bay	770	SK	47180580	265	128.4	0.0748	0.5333	0.0000	0.0000	0.0000	0.0000	0.1027
total slightly FD pop.:	233,586											
- Hague	655	SK	47150340	340	129.6	0.0732	0.2781	0.0000	0.0000	0.0000	0.0000	0.0592
- Sturgeon Lake 154	628	AB	4818816	280	129.2	0.0730	0.7830	0.0000	0.0214	0.0000	0.0000	0.0622
- I. D. No. 18 (Part)	11,388	AB	4816030	5,995	2,138.0	0.0715	0.2641	0.2173	0.1217	0.0000	0.0186	0.0107
- Peter Pond Lake 193	423	SK	47188180	205	137.3	0.0708	0.7457	0.0000	0.0000	0.0000	0.0000	0.0000
- Clearwater No. 99	10,133	AB	4809002	6,360	2,094.7	0.0702	0.0793	0.5214	0.2224	0.0000	0.0047	0.0001

Community	Pop.	Prov.	Geos:	Total Emp	Ttl. Base Emp	FDI	TPDI	Ag DI	En DI	Mn DI	F&T DI	Hyd. DI
- Loon Lake No. 561	930	SK	47170560	600	272.4	0.0701	0.0000	0.7020	0.0788	0.0000	0.0000	0.0000
- Lac Ste. Anne CM No. 28	8,059	AB	4813001	5,180	1,781.3	0.0699	0.1357	0.5970	0.0568	0.0109	0.0000	0.0273
- Turner Valley	1,352	AB	4806009	850	200.6	0.0661	0.3828	0.0000	0.1149	0.0000	0.0000	0.0201
- Minitonas	1,227	MN	46200370	790	357.6	0.0653	0.0000	0.8665	0.0000	0.0000	0.0000	0.0000
- Canoe Lake 165	471	SK	47188170	245	150.3	0.0641	0.5196	0.0000	0.0000	0.0855	0.0000	0.0000
- Smoky Lake	1,057	AB	4812029	640	294.7	0.0634	0.7072	0.0000	0.0457	0.0000	0.0000	0.0187
- Fairview	3,023	AB	4819068	1,925	571.1	0.0632	0.2440	0.0059	0.0000	0.0000	0.0000	0.0113
- Lynn Lake	834	MN	46230470	440	145.2	0.0626	0.1493	0.0000	0.0000	0.1705	0.0000	0.0000
- Swan River	3,917	MN	46200480	2,630	569.6	0.0607	0.7074	0.0000	0.0000	0.0150	0.0000	0.0000
- The Pas 21E	1,213	MN	46210430	700	315.5	0.0588	0.6618	0.0000	0.0000	0.0000	0.0000	0.0000
- Manning	1,139	AB	4817078	670	232.8	0.0586	0.5077	0.0778	0.0760	0.0000	0.0000	0.0000
- Kinistino	701	SK	47150740	455	163.6	0.0569	0.6072	0.0000	0.0000	0.0000	0.0000	0.0000
- La Broquerie	2,038	MN	46020530	1,175	321.7	0.0546	0.0000	0.6391	0.0000	0.0291	0.0303	0.0000
- Hazel Dell No. 335	903	SK	47090600	615	259.3	0.0542	0.1627	0.5379	0.0000	0.0000	0.0000	0.1959
- Beaverlodge	1,779	AB	4819009	1,020	332.1	0.0540	0.4129	0.0194	0.0000	0.0000	0.0000	0.0000
- Spirit River	1,016	AB	4819058	640	255.5	0.0536	0.4244	0.0000	0.0919	0.0000	0.0000	0.0215
- Peace No. 135	1,481	AB	4819071	880	355.3	0.0512	0.0000	0.6561	0.0000	0.0000	0.0000	0.0000
- I. D. No. 20	2,722	AB	4819059	1,705	842.0	0.0493	0.0000	0.7231	0.0843	0.0000	0.0000	0.0392
- Onoway	681	AB	4813014	425	186.2	0.0490	0.5686	0.0000	0.0000	0.0000	0.0000	0.0377
- Niverville	1,514	MN	46020460	825	170.6	0.0486	0.0808	0.1595	0.0000	0.0000	0.0000	0.0000
- Ste. Anne	1,477	MN	46020610	830	178.2	0.0465	0.0975	0.0000	0.0000	0.0535	0.0000	0.0073
- Tisdale	3,045	SK	47140440	1,940	586.7	0.0461	0.4594	0.0000	0.0000	0.0000	0.0000	0.0115
- Elk Point	1,341	AB	4812016	840	399.7	0.0457	0.4091	0.0000	0.2960	0.0623	0.0000	0.0000
- Winnipegosis	771	MN	46170730	460	207.3	0.0436	0.7286	0.0000	0.0000	0.0952	0.0477	0.0000
- Rockwood	6,990	MN	46140360	4,335	834.9	0.0432	0.0000	0.5750	0.0000	0.0331	0.0000	0.0294
- Mountain (South)	830	MN	46200320	550	208.7	0.0425	0.2436	0.6857	0.0000	0.0000	0.0000	0.0203
- Rocky Mountain House	5,461	AB	4809015	3,220	1,037.4	0.0419	0.2926	0.0000	0.3151	0.0000	0.0000	0.0023
- Buffalo Narrows	1,060	SK	47180700	585	217.7	0.0419	0.1110	0.0000	0.0000	0.0000	0.0686	0.0276
- Division No. 19, Uno	3,717	MN	46190450	1,600	640.5	0.0417	0.5020	0.0128	0.0000	0.0000	0.2258	0.0000

Community	Pop.	Prov.	Geos:	Total Emp	Ttl. Base Emp	FDI	TPDI	Ag DI	En DI	Mn DI	F&T DI	Hyd. DI
- Nelson House 170	1,272	MN	46220590	675	332.3	0.0409	0.6645	0.0000	0.0000	0.0000	0.0447	0.0000
- Parkdale No. 498	768	SK	47170470	430	229.8	0.0407	0.0877	0.8516	0.0000	0.0000	0.0000	0.0000
- Invermay No. 305	611	SK	47090540	430	237.0	0.0394	0.0639	0.8047	0.0000	0.0000	0.0000	0.0000
- Hoodoo No. 401	699	SK	47150390	480	240.9	0.0385	0.0000	0.9338	0.0000	0.0000	0.0000	0.0000
- Fairview No. 136	1,812	AB	4819066	1,125	463.6	0.0382	0.0730	0.7258	0.0000	0.0000	0.0000	0.0153
- Cross Lake 19A	998	MN	46220520	445	241.2	0.0376	0.8097	0.0000	0.0000	0.0000	0.0000	0.0221
- Lac du Bonnet	1,076	MN	46010600	745	226.2	0.0374	0.4695	0.0000	0.0000	0.1308	0.0000	0.1865
- Airdrie	12,456	AB	4806021	6,960	1,637.4	0.0371	0.0000	0.0000	0.1132	0.0000	0.0000	0.0007
- Stonewall	2,997	MN	46140390	1,775	306.5	0.0370	0.0409	0.0000	0.0000	0.0000	0.0000	0.0208
- Lloydminster (Part)	7,241	SK	47170290	4,195	1,063.3	0.0356	0.0055	0.0000	0.3388	0.0068	0.0000	0.0107
- Lac la Biche	2,549	AB	4816032	1,380	486.2	0.0353	0.1735	0.0000	0.0000	0.0000	0.0000	0.0006
- Mountain View CM No. 17	9,951	AB	4806028	6,660	2,604.4	0.0351	0.0456	0.8036	0.0588	0.0055	0.0000	0.0031
- McLennan	1,020	AB	4819042	550	258.6	0.0343	0.4605	0.0000	0.0000	0.0000	0.0000	0.0237
- La Ronge	2,578	SK	47180410	1,430	520.1	0.0343	0.0000	0.0000	0.0030	0.0751	0.0000	0.0293
- Œle-à-la-Crosse, NV	1,284	SK	47180670	535	277.6	0.0331	0.5431	0.0000	0.0000	0.0348	0.0000	0.0000
- Barrhead County No. 11	5,591	AB	4813018	3,335	1,328.8	0.0325	0.0000	0.9304	0.0000	0.0000	0.0000	0.0087
- Falher	1,183	AB	4819046	710	264.1	0.0324	0.4400	0.1939	0.0000	0.0000	0.0378	0.0000
- West St. Paul	3,658	MN	46130370	2,275	475.1	0.0322	0.0000	0.0000	0.0000	0.0000	0.0000	0.0235
- Tisdale No. 427	1,163	SK	47140430	710	278.2	0.0321	0.0000	0.7679	0.0000	0.0000	0.0000	0.0545
- Pincher Creek No. 9	3,108	AB	4803011	2,080	832.1	0.0310	0.0000	0.8965	0.0000	0.0000	0.0000	0.0005
- Bjorkdale No. 426	1,263	SK	47140380	825	285.6	0.0306	0.0000	0.8943	0.0000	0.0331	0.0000	0.0000
- Fort Alexander 3	1,579	MN	46190500	825	434.2	0.0306	0.7803	0.0000	0.0000	0.0000	0.0000	0.0000
- Crossfield	1,739	AB	4806026	950	268.4	0.0300	0.1466	0.0737	0.2439	0.0000	0.0000	0.0124
- Laird No. 404	1,102	SK	47150260	700	338.0	0.0264	0.0000	0.9165	0.0000	0.0000	0.0000	0.0000
- Fisher	2,145	MN	46180680	1,475	460.5	0.0259	0.0361	0.9071	0.0000	0.0000	0.0000	0.0000
- Rocky View No. 44	19,888	AB	4806014	12,925	3,073.4	0.0256	0.0000	0.4701	0.1696	0.0028	0.0000	0.0000
- Willow Creek No. 26	4,764	AB	4803018	2,920	1,340.6	0.0254	0.0000	0.9668	0.0000	0.0000	0.0000	0.0000
- Orkney No. 244	1,899	SK	47090110	1,265	323.8	0.0250	0.0000	0.3706	0.0000	0.0000	0.0000	0.0197
- St. Peter No. 369	1,086	SK	47150010	705	362.5	0.0246	0.0000	0.8116	0.0000	0.0263	0.0000	0.0000

Community	Pop.	Prov.	Geos:	Total Emp	Tll. Base Emp	FDI	TPDI	Ag DI	En DI	Mn DI	F&T DI	Hyd. DI
- Star City No. 428	1,081	SK	47140470	875	373.7	0.0232	0.0000	0.9492	0.0130	0.0000	0.0000	0.0000
- Porcupine No. 395	1,321	SK	47140060	1,195	573.1	0.0230	0.1265	0.8167	0.0000	0.0161	0.0000	0.0000
- Westlock No. 92	6,994	AB	4813028	4,550	1,752.2	0.0204	0.1664	0.7582	0.0000	0.0111	0.0000	0.0017
- Preeceville No. 334	1,300	SK	47090620	1,005	423.0	0.0200	0.0984	0.8741	0.0000	0.0000	0.0000	0.0074
- Roblin	1,838	MN	46160520	1,275	376.8	0.0195	0.7501	0.0000	0.0000	0.0000	0.0000	0.0309
- Valleyview	1,980	AB	4818018	1,090	408.2	0.0191	0.1958	0.0000	0.2250	0.0000	0.0000	0.0057
- Barrhead	4,160	AB	4813019	2,625	780.0	0.0188	0.5981	0.0000	0.0000	0.0000	0.0000	0.0000
- Rosthern No. 403	1,817	SK	47150310	945	461.0	0.0186	0.0000	0.8061	0.0000	0.0000	0.0000	0.0294
- St. Andrews	9,461	MN	46130430	6,355	926.1	0.0182	0.0000	0.0122	0.0000	0.0070	0.0146	0.0252
- Thompson	14,977	MN	46220260	8,590	3,025.5	0.0173	0.0000	0.0000	0.0117	0.6116	0.0027	0.0099
- Snow Lake	1,598	MN	46210710	890	478.2	0.0163	0.0000	0.0000	0.0000	0.8983	0.0000	0.0014
- Alonsa	1,652	MN	46170260	1,160	464.1	0.0164	0.2906	0.5208	0.0202	0.0000	0.0210	0.0000
- Athabasca County No. 12	6,049	AB	4813044	4,035	1,338.9	0.0163	0.1206	0.6109	0.0268	0.0071	0.0000	0.0199
- Athabasca	1,965	AB	4813048	1,175	477.7	0.0159	0.4294	0.0000	0.0000	0.0000	0.0000	0.0665
- I. D. No. 19	1,378	AB	4819049	950	528.3	0.0153	0.0461	0.8325	0.0293	0.0000	0.0000	0.0063
- St. Paul	4,881	AB	4812018	2,955	947.6	0.0147	0.4271	0.0000	0.0000	0.0102	0.0210	0.0572
- Dauphin	2,669	MN	46170480	1,835	456.9	0.0136	0.0000	0.7449	0.0000	0.0306	0.0000	0.0000
- St. Paul County No. 19	6,489	AB	4812014	4,065	1,391.2	0.0120	0.1518	0.6444	0.0036	0.0213	0.0000	0.0154
- Didsbury	3,355	AB	4806032	2,005	542.9	0.0109	0.4796	0.0360	0.1533	0.0000	0.0000	0.0000
- Norway House 17	2,818	MN	46220580	1,500	675.3	0.0102	0.7842	0.0000	0.0000	0.0000	0.0439	0.0063
- Smoky River No. 130	2,613	AB	4819041	1,465	702.0	0.0100	0.0000	0.8694	0.0000	0.0000	0.0000	0.0000
- Calgary	710,677	AB	4806016	463,495	106,365.7	0.0092	0.0900	0.0000	0.1595	0.0028	0.0002	0.0000
- Cardston	3,480	AB	4803004	1,895	693.1	0.0088	0.4972	0.0000	0.0000	0.0213	0.0000	0.0000
- Selkirk	9,815	MN	46130470	6,125	1,023.8	0.0072	0.2914	0.0000	0.0000	0.0602	0.0084	0.0740
- Olds	5,542	AB	4806034	3,570	1,079.1	0.0072	0.3684	0.0000	0.2389	0.0000	0.0000	0.0046
- Blood 148	4,013	AB	4803802	1,755	1,043.8	0.0062	0.8038	0.0000	0.0000	0.0000	0.0000	0.0000
- Ritchot	5,146	MN	46020750	3,035	620.5	0.0060	0.0000	0.1353	0.0000	0.0000	0.0000	0.0696
- Nipawin	4,419	SK	47140760	2,980	940.9	0.0058	0.5612	0.0000	0.0000	0.0000	0.0000	0.0634
- Bonnyville No. 87	10,269	AB	4812004	5,900	2,345.9	0.0054	0.0000	0.1659	0.0395	0.0000	0.0000	0.0015

Community	Pop.	Prov.	Geos:	Total Emp	Ttl. Base Emp	FDI	TPDI	Ag DI	En DI	Mn DI	F&T DI	Hyd. DI
- Bonnyville	5,132	AB	4812009	2,890	847.5	0.0048	0.3376	0.0000	0.1892	0.0173	0.0000	0.0291
- Westlock	4,719	AB	4813031	3,095	1,070.7	0.0034	0.6868	0.0000	0.0000	0.0090	0.0000	0.0077
- Fort McMurray	34,706	AB	4816048	20,200	8,010.9	0.0027	0.0000	0.0000	0.8125	0.0000	0.0000	0.0000
- Canmore	5,681	AB	4815023	3,595	1,027.3	0.0026	0.0000	0.0000	0.0000	0.0580	0.0000	0.0241
- High River	6,269	AB	4806006	3,875	897.9	0.0023	0.4447	0.1398	0.0000	0.0000	0.0000	0.0086
- Yorkton	15,315	SK	47090120	10,325	2,944.0	0.0015	0.5018	0.0000	0.0000	0.0000	0.0000	0.0000

*Definitions:

Geos.: Standard geographic code: i.e. 47140040, the first two digits refer to the provincial code (47) is Saskatchewan, the next two digits (14) refer to the census subdivision, the last three digits (004) refer to the census subdivision.

For industrial categories within each of the following sectors refer to Appendix 2.

TPDI: dependence index calculated for the Transfer Payments sector

Ag DI: dependence index calculated for the Agriculture sector

En DI: dependence index calculated for the Energy sector

Mng DI: dependence index calculated for the Mining sector

F& T DI: dependence index calculated for the Fishing and Trapping sector

Hyd DI: dependence index calculated for the Hydro-electric sector.

Appendix 4. Table 4.1

FDI With and Without the Transfer Payment Sector, Excluding Communities with Populations of 250 Persons or Less, 1991.

Community	Pop.	Prov.	FDI(tp)*	TPDI**	Community	Pop.	FDI	Difference FDI-FDI(tp)
- Green Lake	513	SK	0.1788	0.6924	- Green Lake	513	0.4397	0.2609
- Piney	1,559	MN	0.2950	0.5574	- Piney	1,559	0.5032	0.2082
- Upper Hay River 212	333	AB	0.0918	0.7936	- Upper Hay River 212	333	0.2902	0.1984
- Wabasca 166D	404	AB	0.0632	0.8021	- Wabasca 166D	404	0.2609	0.1777
- Alexander	2,399	MN	0.4110	0.3288	- Alexander	2,399	0.5807	0.1697
- Dunnottar	307	MN	0.0818	0.8491	- Dunnottar	307	0.2405	0.1587
- Mayerthorpe	1,692	AB	0.3965	0.3178	- Mayerthorpe	1,692	0.5412	0.1447
- Peter Pond Lake 193	423	SK	0.0706	0.7457	- Peter Pond Lake 193	423	0.2132	0.1426
- Drift Pile River 150	345	AB	0.1207	0.5867	- Drift Pile River 150	345	0.2523	0.1316
- Vilna	314	AB	0.1432	0.5185	- Vilna	314	0.2742	0.1310
- Sangudo	405	AB	0.1884	0.5250	- Sangudo	405	0.3099	0.1215
- Montreal Lake 106	450	SK	0.0943	0.6993	- Montreal Lake 106	450	0.2158	0.1215
- Waterhen 130	509	SK	0.0830	0.7785	- Waterhen 130	509	0.1981	0.1151
- Carrot River	1,027	SK	0.1190	0.6118	- Carrot River	1,027	0.2215	0.1025
- La Loche 222	455	SK	0.0801	0.6906	- La Loche 222	455	0.1820	0.1019
- Consol (Carrot Valley)	1,892	MN	0.4367	0.0000	- Consol (Carrot Valley)	1,892	0.5371	0.1004
- I. D. No. 24	286	AB	0.2054	0.3929	- I. D. No. 24	286	0.2997	0.0943
- Hudson Bay No. 394	1,368	SK	0.4760	0.2454	- Hudson Bay No. 394	1,889	0.5682	0.0922
- Sturgeon Lake 154	628	AB	0.0730	0.7830	- Sturgeon Lake 154	628	0.1645	0.0615
- Division No. 1, Uno	1,447	MN	0.3468	0.2689	- Division No. 1, Uno	1,447	0.4316	0.0848
- Mountain (North)	1,213	MN	0.2105	0.4149	- Mountain (North)	1,213	0.2935	0.0830
- Cross Lake 19A	998	MN	0.0376	0.8097	- Cross Lake 19A	998	0.1194	0.0818
- Stavely	478	AB	0.1185	0.6053	- Stavely	478	0.1994	0.0809
- Cowley	277	AB	0.3032	0.3098	- Cowley	277	0.3823	0.0791
- Fort Alexander 3	1,579	MN	0.0306	0.7803	- Fort Alexander 3	1,579	0.1034	0.0728
- The Pas 21E	1,213	MN	0.0588	0.6618	- The Pas 21E	1,213	0.1300	0.0712
- Reynolds	1,297	MN	0.2219	0.3764	- Reynolds	1,297	0.2909	0.0690
- Division No. 21, Uno	1,839	MN	0.1963	0.3337	- Division No. 21, Uno	1,839	0.2586	0.0623
- Smoky Lake	1,057	AB	0.0634	0.7072	- Smoky Lake	1,057	0.1242	0.0608
- Big River	809	SK	0.2528	0.2742	- Big River	809	0.3133	0.0605
- St. Louis	433	SK	0.1187	0.5435	- St. Louis	433	0.1782	0.0595
- Winnipegosis	771	MN	0.0436	0.7286	- Winnipegosis	771	0.1031	0.0595
- Hines Creek	423	AB	0.1223	0.4165	- Hines Creek	423	0.1785	0.0562
- Canoe Lake 165	471	SK	0.0641	0.5196	- Canoe Lake 165	471	0.1168	0.0527
- Hole or Hollow Water 1	427	MN	0.0763	0.4768	- Hole or Hollow Water 1	427	0.1278	0.0515
- Nelson House 170	1,272	MN	0.0409	0.6645	- Nelson House 170	1,272	0.0891	0.0482
- Stuartburn	1,517	MN	0.1343	0.3412	- Stuartburn	1,517	0.1824	0.0481

Community	Pop.	Prov.	FDI	TPDI	Community	Pop.	FDI	Difference FDI-FDI(tp)
- Claresholm	3,297	AB	0.0839	0.5452	- Claresholm	3,297	0.1312	0.0474
- Sandy Bay	770	SK	0.0748	0.5333	- Sandy Bay	770	0.1190	0.0442
- I. D. No. 17	12,299	AB	0.1778	0.2638	- I. D. No. 17	12,299	0.2203	0.0425
- The Pas 21A	276	MN	0.2087	0.2730	- The Pas 21A	276	0.2507	0.0420
- Crowsnest Pass	6,579	AB	0.0929	0.4316	- Crowsnest Pass	6,579	0.1335	0.0406
- East St. Paul	5,820	MN	0.0947	0.0000	- East St. Paul	5,820	0.1321	0.0374
- Sundre	1,834	AB	0.1361	0.2840	- Sundre	1,834	0.1726	0.0365
- Pelican Narrows	262	SK	0.1546	0.2699	- Pelican Narrows	262	0.1906	0.0360
- High Level	2,849	AB	0.2742	0.0000	- High Level	2,849	0.3101	0.0359
- Big River No. 555	848	SK	0.5385	0.0000	- Big River No. 555	848	0.5715	0.0329
- The Pas	6,166	MN	0.5161	0.0000	- The Pas	6,166	0.5488	0.0327
- St. Clements	7,870	MN	0.0906	0.0000	- St. Clements	7,870	0.1227	0.0321
- Kinistino	701	SK	0.0569	0.6072	- Kinistino	701	0.0885	0.0316
- Onoway	681	AB	0.0490	0.5686	- Onoway	681	0.0801	0.0310
- Powerview	736	MN	0.4779	0.0000	- Powerview	736	0.5084	0.0305
- I. D. No. 14	8,692	AB	0.1643	0.1886	- I. D. No. 14	8,592	0.1938	0.0293
- Tache	7,576	MN	0.0883	0.0000	- Tache	7,576	0.1174	0.0291
- Pierceland	475	SK	0.0918	0.3679	- Pierceland	475	0.1201	0.0283
- Hudson Bay	1,321	SK	0.5588	0.0000	- Hudson Bay	1,868	0.5867	0.0279
- Meadow Lake	4,318	SK	0.1717	0.2396	- Meadow Lake	4,318	0.1987	0.0270
- Evansburg	723	AB	0.1013	0.3266	- Evansburg	723	0.1282	0.0269
- High Prairie	2,932	AB	0.1152	0.2762	- High Prairie	2,932	0.1420	0.0268
- Lac du Bonnet	1,076	MN	0.0374	0.4695	- Lac du Bonnet	1,076	0.0635	0.0261
- Swan River	3,917	MN	0.0607	0.7074	- Swan River	3,917	0.0867	0.0260
- Buckland No. 491	3,556	SK	0.2783	0.0000	- Buckland No. 491	3,556	0.3042	0.0259
- Œle-à-la-Crosse, NV	1,284	SK	0.0331	0.5431	- Œle-à-la-Crosse, NV	1,284	0.0586	0.0255
- Manning	1,139	AB	0.0586	0.5077	- Manning	1,139	0.0839	0.0253
- Division No. 19, Uno	3,717	MN	0.0417	0.5020	- Division No. 19, Uno	3,717	0.0662	0.0246
- Swan River	2,947	MN	0.0838	0.0000	- Swan River	2,947	0.1083	0.0245
- Prince Albert	34,181	SK	0.1556	0.2664	- Prince Albert	34,181	0.1799	0.0243
- Roblin	1,838	MN	0.0195	0.7501	- Roblin	1,838	0.0434	0.0238
- Fort MacLeod	3,112	AB	0.0750	0.4321	- Fort MacLeod	3,112	0.0982	0.0232
- Norway House 17	2,816	MN	0.0102	0.7842	- Norway House 17	2,816	0.0333	0.0231
- Spirit River	1,016	AB	0.0536	0.4244	- Spirit River	1,016	0.0759	0.0223
- Consol (Wanless)	328	MN	0.1977	0.0000	- Consol (Wanless)	328	0.2196	0.0219
- Park (North)	395	MN	0.0998	0.2585	- Park (North)	395	0.1214	0.0216
- Slave Lake	5,607	AB	0.2384	0.0000	- Slave Lake	5,607	0.2597	0.0213
- Elk Point	1,341	AB	0.0457	0.4091	- Elk Point	1,341	0.0652	0.0195
- Turner Valley	1,352	AB	0.0661	0.3828	- Turner Valley	1,352	0.0855	0.0194
- Beaverlodge	1,779	AB	0.0540	0.4129	- Beaverlodge	1,779	0.0733	0.0194
- Whitecourt	6,938	AB	0.4267	0.0000	- Whitecourt	6,938	0.4479	0.0192

Community	Pop.	Prov.	FDI	TPDI	Community	Pop.	FDI	Difference FDI-FDI(tp)
- Blood 148	4,013	AB	0.0062	0.8038	- Blood 148	4,013	0.0251	0.0189
- I. D. No. 18 (Part)	11,388	AB	0.0715	0.2641	- I. D. No. 18 (Part)	11,388	0.0903	0.0189
- Meadow Lake No. 588	2,445	SK	0.2409	0.0000	- Meadow Lake No. 588	2,445	0.2596	0.0186
- Donnelly	421	AB	0.1297	0.1993	- Donnelly	421	0.1481	0.0184
- Tisdale	3,045	SK	0.0461	0.4594	- Tisdale	3,045	0.0642	0.0181
- Hague	655	SK	0.0732	0.2781	- Hague	655	0.0912	0.0180
- Ste. Anne	3,810	MN	0.1330	0.0000	- Ste. Anne	3,810	0.1488	0.0158
- McLennan	1,020	AB	0.0343	0.4605	- McLennan	1,020	0.0494	0.0151
- Hanover	8,905	MN	0.0987	0.0000	- Hanover	8,905	0.1120	0.0133
- I. D. No. 23	7,260	AB	0.2707	0.0567	- I. D. No. 23	7,260	0.2838	0.0131
- I. D. No. 21	2,903	AB	0.1441	0.0956	- I. D. No. 21	2,903	0.1568	0.0127
- Smoky Lake CM No. 13	2,689	AB	0.1194	0.1105	- Smoky Lake CM No. 13	2,689	0.1321	0.0126
- Falher	1,183	AB	0.0324	0.4400	- Falher	1,183	0.0449	0.0125
- Fairview	3,023	AB	0.0632	0.2440	- Fairview	3,023	0.0755	0.0123
- Mountain (South)	830	MN	0.0425	0.2436	- Mountain (South)	830	0.0541	0.0116
- Division No. 22, Unc	2,105	MN	0.0823	0.1689	- Division No. 22, Uno	2,105	0.0934	0.0111
- Barrhead	4,160	AB	0.0188	0.5991	- Barrhead	4,160	0.0298	0.0110
- Irricana	812	AB	0.0790	0.1735	- Irricana	812	0.0897	0.0107
- Air Ronge	782	SK	0.0869	0.0000	- Air Ronge	782	0.0971	0.0103
- Rocky Mountain House	5,461	AB	0.0419	0.2926	- Rocky Mountain House	5,461	0.0521	0.0102
- Hinton	9,046	AB	0.4540	0.0000	- Hinton	9,046	0.4638	0.0098
- Lac Ste. Anne CM No. 2	8,059	AB	0.0699	0.1357	- Lac Ste. Anne CM No. 2	8,059	0.0793	0.0095
- Nampa	496	AB	0.0758	0.1379	- Nampa	496	0.0844	0.0087
- Grande Cache	3,842	AB	0.2331	0.0000	- Grande Cache	3,842	0.2418	0.0087
- I. D. No. 22	4,259	AB	0.1129	0.0867	- I. D. No. 22	4,259	0.1213	0.0083
- Canwood No. 494	1,811	SK	0.0790	0.1116	- Canwood No. 494	1,811	0.0873	0.0083
- Hazel Dell No. 335	903	SK	0.0542	0.1627	- Hazel Dell No. 335	903	0.0624	0.0082
- Grimshaw	2,812	AB	0.1068	0.1200	- Grimshaw	2,812	0.1164	0.0079
- Consol (Cranberry Portu	817	MN	0.1652	0.0642	- Consol(Cranberry Porta	817	0.1727	0.0075
- Paddockwood No. 520	1,053	SK	0.1779	0.0519	- Paddockwood No. 520	1,053	0.1851	0.0072
- Athabasca	1,965	AB	0.0159	0.4294	- Athabasca	1,965	0.0230	0.0071
- Grande Prairie	28,271	AB	0.1513	0.0000	- Grande Prairie	28,271	0.1580	0.0067
- Steinbach	8,213	MN	0.2407	0.0458	- Steinbach	8,213	0.2473	0.0066
- Lynn Lake	834	MN	0.0628	0.1493	- Lynn Lake	834	0.0687	0.0061
- Garden River No. 490	711	SK	0.1636	0.0000	- Garden River No. 490	711	0.1697	0.0061
- St-Pierre-Jolys	907	MN	0.0839	0.0895	- St-Pierre-Jolys	907	0.0898	0.0059
- Duck Lake No. 463	982	SK	0.1890	0.0000	- Duck Lake No. 463	982	0.1949	0.0059
- Alonsa	1,652	MN	0.0164	0.2906	- Alonsa	1,952	0.0222	0.0058
- Westlock	4,719	AB	0.0034	0.6868	- Westlock	4,719	0.0092	0.0058
- St. Paul	4,881	AB	0.0147	0.4271	- St. Paul	4,881	0.0204	0.0056
- Didsbury	3,355	AB	0.0109	0.4796	- Didsbury	3,355	0.0164	0.0055

Community	Pop.	Prov.	FDI	TPDI	Community	Pop.	FDI	Difference FDI-FDI(tp)
- West St. Paul	3,656	MN	0.0322	0.0000	- West St. Paul	3,656	0.0376	0.0054
- Cardston	3,480	AB	0.0088	0.4972	- Cardston	3,480	0.0142	0.0053
- Nipawin	4,419	SK	0.0058	0.5612	- Nipawin	4,419	0.0110	0.0052
- Prince Albert No. 461	3,340	SK	0.2085	0.0000	- Prince Albert No. 461	3,340	0.2137	0.0052
- Peace River	6,717	AB	0.1847	0.0000	- Peace River	6,717	0.1897	0.0051
- Rockwood	6,990	MN	0.0432	0.0000	- Rockwood	6,990	0.0479	0.0048
- Clearwater No. 99	10,133	AB	0.0702	0.0793	- Clearwater No. 99	10,133	0.0748	0.0046
- Lac la Biche	2,549	AB	0.0353	0.1735	- Lac la Biche	2,546	0.0399	0.0045
- Westlock No. 92	6,994	AB	0.0204	0.1664	- Westlock No. 92	6,994	0.0244	0.0040
- St. Andrews	9,461	MN	0.0182	0.0000	- St. Andrews	9,461	0.0221	0.0039
- Buffalo Narrows	1,060	SK	0.0419	0.1110	- Buffalo Narrows	1,060	0.0457	0.0039
- Sexsmith	1,260	AB	0.1031	0.0523	- Sexsmith	1,260	0.1068	0.0037
- Medstead No. 497	699	SK	0.1248	0.0000	- Medstead No. 497	899	0.1283	0.0035
- Crossfield	1,739	AB	0.0300	0.1466	- Crossfield	1,739	0.0335	0.0034
- Ste. Anne	1,477	MN	0.0465	0.0975	- Ste. Anne	1,477	0.0499	0.0034
- I. D. No. 15	3,065	AB	0.3065	0.0000	- I. D. No. 15	3,065	0.3098	0.0034
- Minitonas	1,227	MN	0.0653	0.0000	- Minitonas	1,227	0.0687	0.0034
- Olds	5,542	AB	0.0072	0.3684	- Olds	5,542	0.0105	0.0034
- Parkdale No. 498	768	SK	0.0407	0.0877	- Parkdale No. 498	768	0.0439	0.0033
- Valleyview	1,980	AB	0.0191	0.1958	- Valleyview	1,980	0.0223	0.0032
- Airdrie	12,456	AB	0.0371	0.0000	- Airdrie	12,456	0.0402	0.0031
- Moose Range No. 486	1,408	SK	0.1545	0.0000	- Moose Range No. 486	1,408	0.1575	0.0030
- La Broquerie	2,038	MN	0.0546	0.0000	- La Broquerie	2,038	0.0576	0.0030
- Porcupine No. 395	1,321	SK	0.0230	0.1265	- Porcupine No. 395	1,321	0.0260	0.0030
- Niverville	1,514	MN	0.0486	0.0808	- Niverville	1,514	0.0515	0.0029
- Rainbow Lake	817	AB	0.0749	0.0000	- Rainbow Lake	817	0.0777	0.0029
- I. D. No. 16	5,269	AB	0.0658	0.0404	- I. D. No. 16	5,269	0.0687	0.0028
- Selkirk	9,815	MN	0.0072	0.2914	- Selkirk	9,815	0.0098	0.0027
- Grande Prairie CM No.	12,314	AB	0.1184	0.0269	- Grande Prairie CM No.	12,314	0.1209	0.0025
- La Ronge	2,575	SK	0.0343	0.0000	- La Ronge	2,576	0.0368	0.0025
- Fox Creek	2,260	AB	0.0991	0.0000	- Fox Creek	2,260	0.1016	0.0025
- Fairview No. 136	1,812	AB	0.0382	0.0730	- Fairview No. 136	1,812	0.0406	0.0024
- I. D. No. 5	423	AB	0.0805	0.0000	- I. D. No. 5	423	0.0829	0.0024
- High River	6,269	AB	0.0023	0.4447	- High River	6,269	0.0045	0.0021
- Invermay No. 305	611	SK	0.0394	0.0639	- Invermay No. 305	611	0.0416	0.0021
- Preeceville No. 334	1,300	SK	0.0200	0.0984	- Preeceville No. 334	1,300	0.0220	0.0020
- Bonnyville	5,132	AB	0.0048	0.3379	- Bonnyville	5,132	0.0069	0.0020
- Preeceville No. 334	1,300	SK	0.0200	0.0984	- Preeceville No. 334	1,300	0.0220	0.0020
- Thompson	14,977	MN	0.0173	0.0000	- Thompson	14,977	0.0192	0.0020
- Yorkton	15,315	SK	0.0015	0.5018	- Yorkton	15,315	0.0034	0.0020
- Edson	7,323	AB	0.1786	0.0000	- Edson	7,323	0.1805	0.0019

Community	Pop.	Prov.	FDI	TPDI	Community	Pop.	FDI	Difference FDI-FDI(tp)
- Athabasca County No. 1	6,049	AB	0.0163	0.1206	- Athabasca County No. 1	6,049	0.0180	0.0018
- Wembley	1,347	AB	0.1246	0.0000	- Wembley	1,347	0.1264	0.0017
- Hoodoo No. 401	699	SK	0.0385	0.0000	- Hoodoo No. 401	699	0.0402	0.0017
- Laird No. 404	1,102	SK	0.0264	0.0000	- Laird No. 404	1,102	0.0281	0.0016
- St. Paul County No. 19	6,489	AB	0.0120	0.1518	- St. Paul County No. 19	6,489	0.0136	0.0016
- Cochrane	5,265	AB	0.0758	0.0000	- Cochrane	5,265	0.0774	0.0016
- Mountain View CM No.	9,951	AB	0.0351	0.0456	- Mountain View CM No.	9,951	0.0367	0.0016
- Tisdale No. 427	1,163	SK	0.0321	0.0000	- Tisdale No. 427	1,163	0.0336	0.0015
- Whitemouth	1,714	MN	0.0764	0.0314	- Whitemouth	1,714	0.0779	0.0014
- Torch River No. 488	2,022	SK	0.1192	0.0000	- Torch River No. 488	2,022	0.1206	0.0013
- Fisher	2,145	MN	0.0259	0.0361	- Fisher	2,145	0.0269	0.0009
- Stonewall	2,997	MN	0.0370	0.0409	- Stonewall	2,997	0.0379	0.0009
- St. Peter No. 369	1,086	SK	0.0246	0.0000	- St. Peter No. 369	1,086	0.0255	0.0009
- I. D. No. 19	1,378	AB	0.0153	0.0461	- I. D. No. 19	1,378	0.0160	0.0008
- Peace No. 135	1,481	AB	0.0512	0.0000	- Peace No. 135	1,481	0.0520	0.0007
- Lac du Bonnet	2,231	MN	0.1010	0.0000	- Lac du Bonnet	2,231	0.1017	0.0007
- Rosthern No. 403	1,817	SK	0.0186	0.0000	- Rosthern No. 403	1,817	0.0192	0.0006
- Calgary	710,677	AB	0.0092	0.0900	- Calgary	710,677	0.0098	0.0006
- Rocky View No. 44	19,888	AB	0.0256	0.0000	- Rocky View No. 44	19,888	0.0262	0.0006
- Orkney No. 244	1,899	SK	0.0250	0.0000	- Orkney No. 244	1,899	0.0255	0.0005
- Snow Lake	1,598	MN	0.0163	0.0000	- Snow Lake	1,598	0.0168	0.0005
- Cremona	393	AB	0.0840	0.0000	- Cremona	393	0.0843	0.0002
- Loon Lake No. 561	930	SK	0.0701	0.0000	- Loon Lake No. 561	930	0.0703	0.0002
- Shell River	1,165	MN	0.1024	0.0000	- Shell River	1,165	0.1025	0.0002
- Ritchot	5,146	MN	0.0060	0.0000	- Ritchot	5,146	0.0062	0.0002
- Pincher Creek No. 9	3,108	AB	0.0310	0.0000	- Pincher Creek No. 9	3,108	0.0311	0.0001
- Shellbrook No. 493	1,834	SK	0.1285	0.0000	- Shellbrook No. 493	1,834	0.1286	0.0001
- Star City No. 428	1,081	SK	0.0232	0.0000	- Star City No. 428	1,081	0.0233	0.0001
- Dauphin	2,669	MN	0.0136	0.0000	- Dauphin	2,669	0.0137	0.0001
- Bjorkdale No. 426	1,263	SK	0.0306	0.0000	- Bjorkdale No. 426	1,253	0.0307	0.0000
- I. D. No. 20	2,722	AB	0.0493	0.0000	- I. D. No. 20	2,722	0.0493	0.0000
- Barrhead County No. 11	5,591	AB	0.0325	0.0000	- Barrhead County No. 11	5,591	0.0325	0.0000

Definitions:

*FDI(tp): forest industry dependence with the transfer payment sector included in the calculation.

**TPDI: dependence index calculated for the transfer payment sector.

Appendix 5: Estimation of In-kind Income from Traditional Harvest Survey Data

5.1 Estimate of Volume Harvested: Waterhen, Saskatchewan, 1992.

Traditional harvest survey (THS) data used in this study was collected by the Meadow Lake Tribal Council of Saskatchewan for use in forestry management planning. The THS was conducted for 1992 harvest rates on Waterhen Reserve 130, Saskatchewan.[30] The MLTC surveys were not conducted for the purpose of this research. However, this analysis demonstrates the importance of collecting information that is accurate and consistent. It is unlikely that any given set of THS data will meet the requirements of all research interests (Usher and Wenzel 1987).

The response rate to the surveys was 95 percent of all households. The total number of households surveyed was 142. One household head responded for all household members, the sample population (all ages) is 556 people. Of the sample population, 282 persons were over the age of 15 (about 51 percent), and 16 people reported being over the age of 65. Of the 282 who provided demographic information on their households, 8 people did not comment on their personal subsistence activities.[31]

The remaining 274 persons represented in the survey consisted of 138 women and 136 men. There were 93 people (33.9 percent) who stated they did not participate in harvest activities. There were 181 people (66.1 percent) who stated they engaged in

[30] It is not known how representative the 1992 harvest year is of the subsistence harvest associated with the 1991 census year.

[31] There were six persons who refused to comment on subsistence activities, and two persons who said they were too sick that year to take part in the 1992 harvest.

subsistence activities. Of the sixteen seniors 65 years of age and older, only one said they did not participate in harvesting activity.

The survey was based on the individual's recall of their subsistence activity and harvest of big game, game birds, fish, berries, and fuelwood in the previous calendar year. Questions regarding trapping activity were asked on the survey, but very little activity was reported. Many respondents explained a "no trapping" response by noting low pelt prices in 1992; fur prices have been dropping since 1984 (McNab 1992). The trapping data reported in the surveys was inadequate for calculating a harvest value (i.e., incomplete answers), and was omitted from the final calculation of harvested volume.

Fur trapping for non-local, commercial sales is considered basic activity. Trapping is categorized according to SIC codes. So trapping is captured by the standard economic base measure. However, the meat from trapped species, and the fur used for domestic use (i.e., subsistence use of trapped species) is not captured in the THS. The contribution to domestic consumption from species like rabbit, beaver, muskrat and squirrel may be significant, particularly to the elderly (Beckley and Hirsch forthcoming).

Information was collected concerning the harvest of medicinal plants, however, no attempt was made in this study to impute a market value. The properties of such plants are not easily equated to pharmaceutical substitutes, if such substitutes even exist. Wild rice harvesting, as well as guiding/outfitter services were also reported but could not be quantified, and thus are not included. Lastly, there were no questions pertaining to craft or alternative forest product production/collection in the survey.

Calculating volumes of harvest based on survey data was complicated by responses that were qualitative (i.e., some, a few, a lot), left blank (no amount recorded but participation in activity indicated), or not readable. Rather than ignore their activities, an average amount harvested within each category (animals, berries, and fuelwood) was calculated and used for active and moderate harvesters.[32] Table 5.1.(1) shows the percentage of estimated responses and respondents for each category.

The total number of responses and volume harvested estimated, as a percentage of the total (responses and volume) was not significantly large, except perhaps or fuelwood. Many respondents said they spent time collecting fuelwood, but did not state the quantity of wood that they collected. As a result almost one-third of the volume of wood harvested is based on calculated average values.

Table 5.1.(1): Percentage of Estimated Responses Out of Total Responses, Waterhen, Saskatchewan, 1992.

	big game	birds	fish	berries	fuel
proportion of estimated responses out of total responses	6.7	10.4	7.8	12.2	23.3

Total volume of domestic harvest is based on the total edible weight of each species harvested. In a preliminary survey, respondents felt it was too personal revealing the number killed for each individual species. Instead, numbers for killed and harvested game were obtained for the broad categories of: big game, game birds, and fish. The volume of harvest in each category was then divided into subcategories of commonly

[32] "Active" is defined as having engaged in three or more subsistence activities, "moderate" participants engaged in one or two bush activities.

harvested species, according to the proportion of species harvested for a typical year.[33] This is necessary because of the large differences in volume of edible meat that the various species provide. Table 5.1.(2) shows the proportions used to calculate the percentage of each species harvested, as well as the edible weight (kg.) for each species.

Table 5.1.(2): Proportion of Species Harvested and Edible Weights*, Waterhen, SK., 1992

Category	Species	Proportion of Species harvested per category	Edible weight per species (kg.)
Big Game	moose	25	227.00
	deer	73	46.00
	elk	2	140.00
Game Birds	duck	52.5	0.77
	Canada goose	17.5	2.14
	partridge	30	0.33
Fish	whitefish	73	0.78
	pickeral	24	0.73
	jackfish	3	0.87

*Edible Weights for: moose, deer, duck, partridge, and all species of fish are from Tobias and Kay (1994); elk is from Beckley and Hirsch (forthcoming); and Canada geese from Berkes *et. al.* (1994).

Conversion factors for fuelwood, according to Tobias and Kay (1994), equate one half tonne truck load of uncut logs to 0.5 cords. It is not clear whether truck loads of fuelwood reported in the THS were uncut or cut. Although the above conversion factor is used in this study, it possibly represents a minimum value since a truck load of cut wood is greater than 0.5 cords.[34] If wood is cut, one truck load would be approximately equivalent to .75 cords of wood. Fuelwood volume, and value, could thus be underestimated by as much as 25 percent.

[33] Proportion of species harvested for a typical year is based on personal communications with an elder (who is also an active harvester) of the Waterhen Lake First Nation. Some species (swans, cranes, snow geese, some fish species) are harvested, but not regularly, nor in large proportions compared to common species. Volume of harvest of these species, since harvest is intermittent, is not estimated here.

[34] A half tonne truck bed is 8 feet long, 4 feet wide, and 3 feet deep, or approximately 96 cubic feet. A cord is 128 cubic feet.

5.2 Estimate of In-kind Value

Replacement value is used as a measure of in-kind value and calculated by deriving what it would cost the community to replace harvested foods (pound for pound) with a store-bought, if they did not engage in subsistence. Replacement value provides a welfare-equivalent measure suitable for comparing the income contributions of subsistence of different communities. Replacement values are not suitable for deriving the income contribution of a community to a national income measure (i.e., such as that needed to calculate economic base multipliers), because it does not account for the production costs of subsistence, such as gas, ammunition, equipment and repairs (Usher 1971, Palmer 1973). Also replacement values do not account for the superior nutritional value and taste of country foods (Wein 1989, Nutrition Liaison Committee 1984). Nor do replacement values account for the fact that people are likely to choose cross-substitutes, depending on relative prices, availability, and/or personal preferences.

Replacement values are used here to illustrate how a substitute value can be used in the calculation of the FDI. Generally, it is believed that it is better to provide a measure of subsistence harvest, acknowledging the theoretical and methodological limitations resulting from replacement value calculations, than it is to ignore this sector's contribution to the total economy (Palmer, in Usher 1976).

The replacement value of the subsistence harvest is determined by calculating average prices for store bought substitutes. Table 5.2.(1) lists these prices. An average was taken between: available substitutes; the months of September and March to adjust

for seasonal differences in prices (and available substitutes); and the two main grocery stores in Meadow Lake.

Beef was used as a substitute for the big game species, moose, deer and elk. The average price of a variety of cuts is used, since using only ground beef prices undervalues the harvest, particularly since none of the butchered game is actually ground. The imputed price for big game ($12.14/kg) is higher than the price used in Tobias' and Kay's 1994 study as a result.

Average prices of roasting and frying chickens ($4.23/kg) is used to approximate prices for the harvest of ducks, geese, and partridge. Since store bought prices include bones, whereas edible weights do not, a discrepancy results. Thus, pound for pound, the store price underestimates the amount of meat, and thus the value of game birds.

There are no fresh whole fish available in either store, although frozen (fresh) fish is sometimes available. The other alternative substitute would be breaded, frozen varieties of cod. The frozen, whole fish is likely the closest and least expensive substitute. However, since it is not always available an average was taken for all fish products. The imputed average price is $7.08/kg.

Fresh blueberries and strawberries are available in the stores in the spring but not winter. The prices of fresh and frozen berries are averaged to get a year-round price of $5.18/kg. Lastly, cords of wood are not sold at either store considered, but are available elsewhere for $80.00/cord (personal communication resident).

Table 5.2.(1): Average Store Prices, 1991*

Grocery Item:	IGA	Co op	Average price between stores
ground beef	5.24	6.17	5.71
rump roast	9.78	11.23	10.51
sirloin	10.40	12.17	11.29
tenderloin	20.62	21.50	21.06
average beef price/kg.			$12.14
roasting chicken	4.21	4.49	4.35
fryer chicken	3.92	4.30	4.11
average chicken price/kg.			$4.23
frozen (fresh) fish	-	4.30	4.30
frozen fish in batter	11.31	8.41	9.86
average fish price/kg.			$7.08
fresh blueberries	5.36	4.27	4.82
fresh strawberries	4.26	3.52	3.89
fozen berries	6.82	-	6.82
average berry price/kg.			$5.18
cord of wood		80.00	$80.00

*To obtain 1991 store prices 1993 prices were adjusted using the consumer price index for meat and food categories for Saskatchewan.

Combining prices with calculated estimates of edible harvest (kg.) enables the calculation of replacement values. These are presented in Table 5.2.(2).

Table 5.2.(2): Estimates of Edible Weights and Replacement Values, Waterhen Reserve, Saskatchewan, 1991

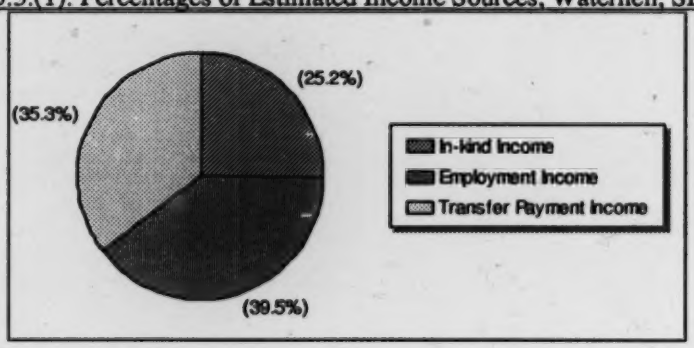
species	number harvested	edible kg. per kill	total kg.	store price per kg.	replacement value
Big Game:					
moose	99.35	227.00	22,552.45	12.14	$273,786.74
deer	290.10	46.00	13,344.60	12.14	$162,003.44
elk	7.95	140.00	1,113.00	12.14	$13,511.82
total:			37,010.05		$449,302.01
Game Birds:					
ducks	388.84	0.77	299.41	4.23	$1,266.50
geese	129.61	2.17	277.37	4.23	$1,173.28
partridge	222.20	0.33	73.33	4.23	$310.19
total:			650.11		$2,749.97
Fish:			edible kg. harvested		
whitefish			4,678.12	7.08	$33,121.09
pickerel			1,538.01	7.08	$10,889.11
jackfish			192.25	7.08	$1,361.13
total:			6,408.38		$45,371.33
berries			edible kg. harvested		
total:			1,802.52	5.17	$9,319.03
fuelwood			# of cords		
total:			1,625.02	80.00	$130,001.60
Total Replacement Value of Volume Harvested:					$636,743.93

5.3. Overview of the Total Economy of Waterhen Reserve, Saskatchewan

The replacement value of $636, 743.93 is calculated for the estimated harvested volume for the 142 households surveyed. The average replacement value per household is equal to $4, 484.11. Extrapolating from the average value per household over all households (there are 150) results in a total estimated value of $672, 616.83 for the community of Waterhen, SK.

Total community cash income from both full and part time employment wages and government transfer payment sources is obtained from the 1991 census. Total cash income amounts to $1, 990, 746.70. Based on percentages provided by Statistics Canada in the 1991 census, part and full-time employment income contributes 52.9 percent to total cash income, or $1, 053,105.00. Transfer payments (46.4 percent is government transfers and 0.8 percent is from investment payments) contribute 47.2 percent to the total economy, or $939, 632.44. In-kind income contributes largely to the total economy of the Waterhen community, boosting total community income to $2, 663, 363.50.

Figure 5.3.(1): Percentages of Estimated Income Sources, Waterhen, SK., 1991



The contribution from the subsistence sector emphasizes the importance of identifying the Waterhen reserve as being dependent on these forest-related activities. Although the FDI can be adapted to include in-kind income, it does not provide more than a description of the economy. Thus, it is important to seek an understanding of the interrelationships between wage income, the transfer payment sector and the subsistence sector, before the effects of potential change brought on by market or policy shocks in the forest industry sector (or any sector) can be clearly identified.